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Notes of the Month

WORLD TRADE IN COTTON AND MAN-MADE TEXTILES

In the first quarter of this year, cotton yarn output in those countries for which regular figures are available—including all the major textile exporting countries—was about 3% less than in the first quarter of 1960, states the latest Cotton Board statistical review. A 12% reduction in U.S yarn output was more than enough by itself to account for this decline. Production in the U.K. and, probably Belgium, was also less than a year earlier, but output in Japan, India and most of the other main producing countries showed some increase. After its notable expansion in 1959 and 1960 world trade in cotton piece goods in the first quarter of this year seemed to be much the same in total as in the corresponding period of last year. Exports from Japan, Italy, Spain and, probably, Hong Kong were greater than a year earlier, but shipments from the U.K., India, Pakistan and Switzerland were smaller. The level of exports from the U.S.A. was virtually unchanged compared with the first quarter of 1960. The slight recovery in world trade in man-made fibre fabrics seemed to have continued in the first quarter of this year, when total exports were probably somewhat greater than in the same period of 1960. Exports from Japan, Italy and the Netherlands were greater than a year earlier, but there were reductions in shipments from the U.K. and the U.S.A.

The rate of output per working day in the U.K. cotton industry improved appreciably in March and April in comparison with the first two months of the year. Compared with the peak rates of output reached in the Autumn of 1960, however, yarn production in May and cloth production in April showed reductions of 5% and 3% respectively, the reason being the reduction in the standard working week. In spinning the main feature was the continued low level of output in the man-made fibre section, where the trade in the very coarse yarns for tufted carpets remained depressed. In the weaving section the chief features of interest have also been on the man-made fibres side, e.g. the fall in the output of tyre fabric, synthetic fibre fabrics and spun fabrics and the very marked expansion in the output of filament rayon fabrics. In the doubling section, which has been hard hit by imports of doubled yarn, the position has continued to deteriorate.

With the notable exception of the doubling section the offtake of the industry's products has been in general satisfactory. The rate of ordering has been very slow, however, and order books have been shortening week by week, though they still remain adequate on the whole to ensure full-time working in the immediate future. Home market demand for clothing remains high. On a seasonally adjusted basis it looks as though the pronounced increase in retail sales of clothing (corrected for price changes), which was such a feature of 1959 and 1960, may have flattened out this year, but the level in the first four months of the year was about 4% up on the same period of last year. Unfortunately the reasonably healthy state of final demand has been more than offset by the very rapid increase in imports of yarn, cloth and apparel. This, coupled with uncertainty about the future of the ceilings on Commonwealth imports, has helped to cause the marked slowing down in the rate of ordering and also a tendency to postpone decisions about whether or not to participate in the re-equipment phase of the reorganisation schemes.

Imports of cotton piece goods expanded yet again to reach a new record level of 225 million sq. yds. in the first quarter of this year. Imports from Spain were slightly less than in the preceding quarter as also were arrivals from Hong Kong and Pakistan, but increases were recorded in imports from India and also from Portugal, Yugoslavia, Formosa, the U.S.A. and Canada, all of whom are now sending very considerable quantities of cloth to this country. Imports in April and May totalled 127 million sq. yds., a moderate reduction from the first quarter level. A feature of the import trade has been the very big increase in imports of finished piece goods.

U.K. exports of cotton yarn, cotton piece goods and man-made fibre piece goods in the first quarter were all marginally greater than in the preceding quarter but less than in the first quarter of 1960. Compared with a year earlier shipments of cotton piece goods to a large number of markets showed reductions, notably South Africa, Rhodesia, the Congo, Australia, Burma, the U.S.A., Canada and Scandinavia, but exports to British West Africa, French Africa and the Irish Republic were greater. The principal decreases in exports of man-made fibre fabrics were in trade with South Africa and Rhodesia.

CARAVAN SHOWS HOSIERY RESEARCH RESULTS

A mobile caravan is to tour the wool industry to demonstrate to firms the latest technological advances. It is part of a scheme to improve existing liaison and advisory services and has been devised by the Hosiery and Allied Trades Research Association. Fitted with scientific equipment worth almost £1,500, the caravan is planned as a mobile exhibition, demonstration laboratory and scientific lecture theatre. Half of one side lifts to form a canopy and, in this position, the caravan is ready for use in its exhibition role. When used as a lecture theatre, there are seats for about twelve people and the unit is fitted with film and slide projectors.

Staffed by two technologists, it will visit firms in the chief hosiery and knitwear centres and in more distant locations from which it is difficult to release staff for training courses. The aim is to present results of scientific research operatives, many of whom are highly-skilled but, through circumstances beyond their control, are not fully aware of the possibilities for technological improvements, even when using existing machinery.

BUSY YEAR FOR SHIRLEY DEVELOPMENTS

In reviewing the activities of the company at the recent annual general meeting of Shirley Developments Ltd., the chairman, Sir Raymond Streat, said the past year had been a busy one. The slack spell during the previous year had, however, given them an opportunity to start a thorough reorganisation of the supply side of instrument activities and the steps then taken to arrange more reliable supplies and larger stocks were proving valuable now that demand was growing again. The shortage of skilled firms to make the instruments was a constant headache but the company was gradually improving the designs to make them both easier to manufacture and better to use.

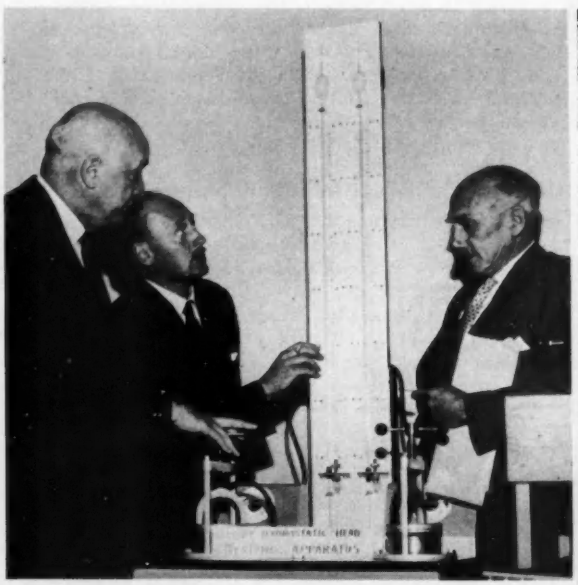
"One instrument," continued Sir Raymond, "in which we have great confidence is the H.A.T.R.A. Hosextender. We have been selling this quality control device, developed by the Hosiery and Allied Trades Research Association for use on ladies' stockings, for only a few months but sales have gone well and we are now waiting for another batch from our suppliers. We are looking forward to the international knitting machinery exhibition in October as an opportunity of increasing the sale of this and other instruments of interest to the hosiery trade."

Referring to the company's co-operation with commercial firms Sir Raymond said one of the most promising instruments was a device developed by Courtaulds Ltd. (based on Shirley's well-known line gratings) which enabled the picks or courses per in. in cloth to be checked continuously while the cloth is moving at speed. It can be used with great advantage on stenters finishing warp knit fabric, for example, and there was no reason why it should not be used on cloth inspection tables. The first commercial prototype had just been made and delivery of limited quantities would commence shortly.

Shirlastain, the fibre identification dyestuff invented by Shirley Institute many years ago, was now being sold by the company and in mentioning this, Sir Raymond, pointed out that while the original Shirlastain had a first class reputation for its ability to differentiate between the various natural fibres, it was developed at a time when man-made fibres hardly existed—except for the rayons—and it did not perform well on the new synthetics. However, scientists at Shirley Institute had now developed two more Shirlastains, one which distinguished cotton from viscose rayon with remarkable clarity and the other which differentiates amongst the many synthetic fibres such as nylon, "Terylene," the acrylics, etc.

Firms who sold machines under licence from the company had done well during the year, especially on the spinning side. Saying that the redesigned automatic size box had also sold well, Sir Raymond added: "We have great confidence in the future of this machine since the accuracy of control it provides is an invaluable basis for high productivity in weaving. The old saying that a chain is as strong as its weakest link is very true in sizing-weaving. Time and again I hear of firms installing up-to-date weaving machines that require near-perfection in warp and weft only to find that their sizing equipment produces warps varying so much in weavability that weaving efficiency is no better than before. Despite many flattering efforts by sizing machine manufacturers throughout the world to copy us without infringing our patents, no other machine exists which can control sizing as the 'Shirley' automatic size box does and the growth of sales demonstrates how this is being accepted in the trade."

The number of installations of the "Shirley" pressure point system carried out fell considerably last year but this was obviously due to uncertainty in the trade about ordering equipment. New orders were now coming in again rapidly as more and more mills realised that the system provided the best answer to dust in cardrooms. Based on fundamentally sound principles, it combined ultra-high efficiency with extremely low running costs and yet did not interfere with the operation of the card.



Sir Raymond Streat (chairman, Shirley Developments Ltd.); Mr. R. G. Dunn (sales executive, Shirley Developments); Mr. D. E. Davies (director, P. R. Lawson and Sons Ltd.) examining a new unit. It is the Shirley hydrostatic head testing apparatus for assessing the resistance to the passage of water of proofed fabrics permeable to air

Sir Raymond and Mr. W. R. Wadsworth (director, Wm. Frost and and Sons Ltd., Macclesfield,) and vice-chairman of Shirley Developments inspecting the completely new Shirley thickness gauge on view for the first time

Combing and Spinning "Courtelle" Fibres Using Standard Bradford Equipment

Over the past two years large weights of tops and yarns made from standard "Courtelle" fibre have been produced at Courtaulds Ltd., Westcroft Mill, Bradford, and it is on the information accumulated that this article is based

By K. S. BUTTERFIELD, B.SC., A.T.I.*

TWO sources of supply are available to the worsted topmakers, i.e., staple fibre or continuous filament in tow form. Staple fibre is offered in the following deniers and lengths: (*a*) 3 den. 4 in., (*b*) 4·5 den. 6 in., and (*c*) 6 den. 6 in. Tow is available in 3, 4·5, or 6 den. and is of approximately 480,000 den. total weight.

Carding

No difficulty is experienced in the production of slivers from 100% "Courtelle" staple fibre. No additions to the fibre prior to processing are necessary, as the finish applied during the manufacture of the fibre consists of an adequate lubricant plus an anti-static medium. This, however, does not preclude the use of small additions of lubricants or anti-statics aids if the processor so wishes.

Opening prior to carding is not necessary. A correctly adjusted hopper blade will present the tufts to the feed rollers in a suitably opened condition and while satisfactory carding can be achieved on a standard double cylinder card clothed for 58s/64s wool, a single cylinder card is equally suitable and usually gives less fibre breakage. Alterations to the card may be necessary due to the bulkiness of the fibre, for example the weigh pan on the hopper fills more quickly than with other fibres necessitating more frequent weighing. The cohesion of the fibre is very good and there is little waste due to fly and droppings. Details and settings of the single cylinder card are set out in Table 1.

Table 1

Roller	Diam. of Bare Roller (ins.)	Calc. Surface Speed of Rollers (ins./mins.)	Counts and Crowns	Points per sq. in.
Feed roller	3	21	Needle	—
Feed clearer	2½	5	Point	—
1st taker-in	30	1,381	Garnett	—
2nd taker-in	27	2,460	70/7	196
3rd taker-in	27	4,919	90/9	324
4th taker-in	27	9,838	100/10	400
1st top divider	20	220	60/6	144
2nd top divider	16	216	70/8	224
1st bottom divider	16	216	90/10	360
2nd bottom divider	16	216	110/10	440
Taker-in worker	12	189	90/10	360
Taker-in stripper	4½	410	70/8	280
Swift	50	18,228	140/12	672
1st worker	12	230	120/12	576
2nd worker	12	230	125/12	600
3rd worker	12	230	130/12	624
Strippers	4½	3,522	110/9	396
Fancy	16	21,867	75/7	210
Doffer	40	1,257	130/12	624

Speed of swift: 116 r.p.m.

Surface speed ratios:

Fancy/Swift	1·2 to 1
Swift/Workers	79·3 to 1
Stripper/Workers	15·3 to 1

Setting	4 in. Staple	6 in. Staple
Taker-in worker to taker-in	14	12
Taker-in stripper all round	22	22
1st worker to swift	18	18
2nd worker to swift	22	22
3rd worker to swift	24	24
All strippers to workers and swift	22	22
Doffer to swift	24	24

Preparatory Gilling for Combing after Carding

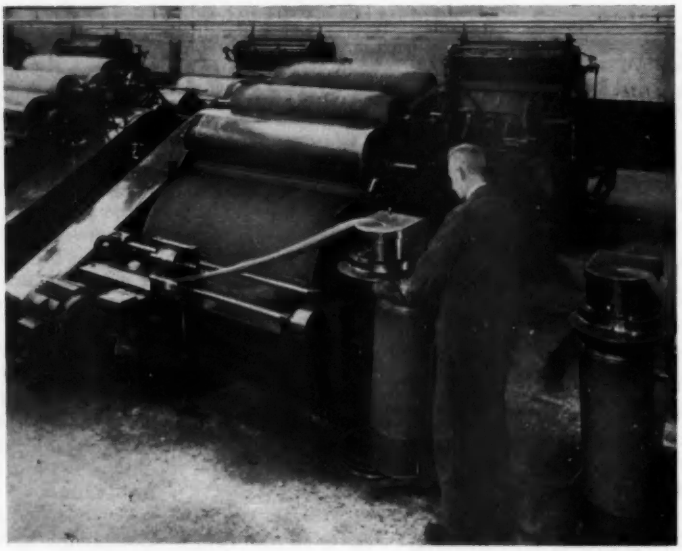
The particulars regarding double gilling are given in Table 2. This is a conventional method of preparing card sliver for the comb. A technique has been adopted at Westcroft Mill where with the finer deniers 3 and 4·5 one gilling is dispensed with; this leads to a reduction in the number of neps in the comb sliver—(*J.T.I.*, Vol. 50, No. 3, Mar. 1959, W. Hardacre).

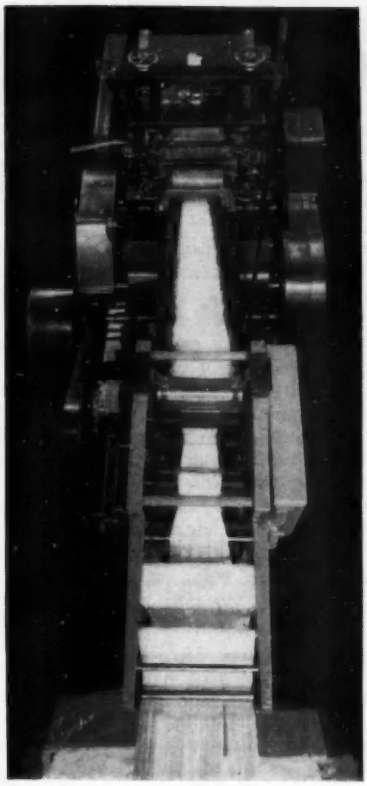
It is important in the application of single gilling to ensure that a reversal of the sliver is introduced. In other words the end of the sliver at the bottom of the can from the 1st gill box must form the inner core of the punch ball and be last into the comb.

Table 2

	Weight per 5 yds. of input sliver ozs.	drs.	No. of doublings	Draft	Weight per 5 yds. of output sliver ozs.	drs.
1st Preparer	1	12	Average 22	5	8	0
2nd Preparer	8	0	5	5·3	7	8

* *Manager, Westcroft Mill, Bradford.*





(above) Carding "Courtelle" staple fibre

(right) Overhead view of Courtaulds' tow to top convertor

Tow to Top

When commencing with "Courtelle" tow a convertor is necessary and the following observations appertain to the processing of tow across the Courtaulds' Design tow-to-top convertor. Other convertors such as the Pacific and Rieter give equally good results. Four tows each of 480,000 den. are fed to the machine and the suitably tensioned filaments are cut beneath a cutting roller which is bearing hard down on a plain steel anvil roller. The sheet of cut fibres is carried forward on an endless apron to the back rollers of an intersector gill box of standard design.

After gilling the sliver passes into a crimper box and then into a can coiler. Sufficient crimp is inserted to give the necessary cohesion for efficient removal of the slivers from the cans at the back of the next gill box. The crimp is not permanent and is removed during the following operations. After cutting and gilling the sliver is treated in the same way as the carded sliver but receives three gillings in all and the balling punch prior to noble combing. A 15 lb. ball is prepared on the punch, 14 in. diam. with a soft centre.

Combing

The input sliver weight to the Noble comb is 7½ oz./8 oz. per 5 yd. and the output on both white and coloureds can be in the region of 90 lb./hr. When combing white 4·5 den. 6 in. or 4 in. approximately 3% noil is removed; with 4.5 den. coloured material however approximately 2¼% noil is made. For 3 den. 4 in. a noil return of 3¾/4% can be expected. Although the amounts of noil removed appear small, it has been proved over the last two years that it is essential to comb "Courtelle" which is intended for single yarn in double jersey fabric. Very little heat is required on the combs usually the small circles only being heated to a temperature a little above blood heat.

It perhaps should be mentioned at this stage that large amounts of matt standard "Courtelle" are being dyed to a wide range of shades for use primarily in knitted outerwear. The first opportunity for carrying out the dyeing is at the tow stage. The dyed tow is given a retreatment with adequate soft finish and anti-static agent, and should be ready for conversion into combed top in the same way as undyed tow. Care should be taken to ensure that judicious blending of cartons of tow is carried out if the order weight is fairly large as the amount of tow which can be dyed in one loading will be limited by the machine capacity.

The second stage for dyeing, which is useful with smaller order weights is by dyeing uncombed converted sliver as hanks of slubbing or in the top form. Two gillings are necessary to open up the rather matted sliver and prepare it for first combing. No applications of processing aids should be necessary with dyed material, although the comber may at his discretion use a little additional anti-static agent, e.g. Lissapol N or Courtaulds' "Courtelle" anti-static solution.

As "Courtelle" has a good fibre-to-fibre cohesion the tops can be sold in ball form, and these usually weigh 8 lb. with a sliver weight of 2½ oz./5 yd. They are prepared by two gillings after combing.

Noble Combs

Chrome tanned leathers are preferable to oak tanned as they reduce considerably the collections of waste and fly. The circles should be suitable for combing fine crossbred-botany wool. Pinning: 40 small circle, 36 large circle. The particulars appear in Table 3.

Table 3

Settings

Two Gillings—after carding.
3 den. 4 in. $\frac{5}{16}$ in. inside $\frac{1}{4}$ in. outside.
4·5 den. 6 in. $\frac{1}{4}$ in. inside $\frac{1}{4}$ in. outside.
6 den. 6 in. $\frac{1}{4}$ in. inside $\frac{1}{4}$ in. outside.

One Gilling—after carding.
$\frac{5}{16}$ in. inside $\frac{1}{4}$ in. outside.
$\frac{1}{4}$ in. inside $\frac{5}{16}$ in. outside.
$\frac{1}{4}$ in. inside $\frac{5}{16}$ in. outside.

View of the balling punch

Cut Tow
3 den. 4 in. $\frac{3}{16}$ in. inside $\frac{7}{16}$ in. outside.
4·5 den. 6 in. $\frac{1}{4}$ in. inside $\frac{7}{16}$ in. outside.
6 den. 6 in. $\frac{1}{4}$ in. inside $\frac{7}{16}$ in. outside.

Pillars Wheels.
3 den.—40
4·5 den. and 6 den.—45

Rack Wheels.
64—all types.

Rectilinear Combing

For either carded sliver or/and tow the sliver should be made 2 oz. or rather more for 5 yd. by two gillings after the card, or three gillings including the cutter gill box. The following settings are used on a Prince-Smith and Stells narrow model rectilinear comb. Comb feed: 12 ends of 2 oz. slivers (16 on broad model).

Twenty picker wheel; 26 gauge; 66 top comb.

Porcupine-medium segment. Recoil, 30 teeth.

Setting of segments: 1st blade under closed nipper. Short wool carriage cams.

Carriage arm bottom setting between marks 4 + 5 for 4 in. staple.

Carriage arm bottom setting between marks 3 + 4 for 6 in. staple.

Two gillings follow combing to produce a top of $2\frac{1}{2}$ oz. for 5 yd. for Bradford system or $3\frac{1}{4}$ oz. for 5 yd. for continental spinners.

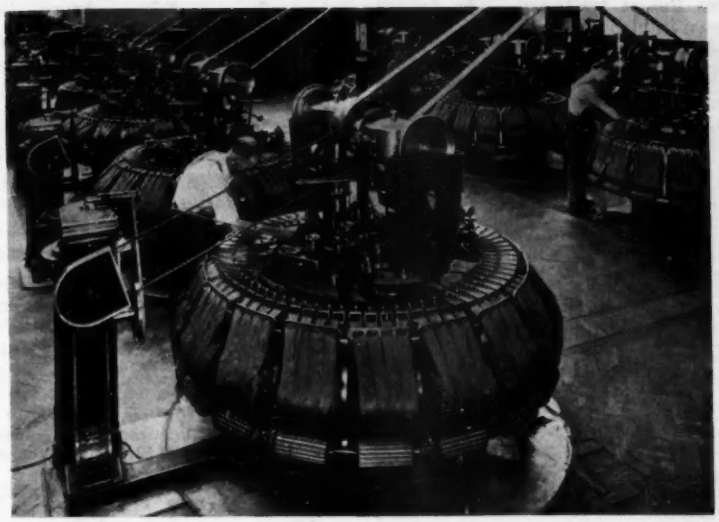
Drawing and Spinning

Various long staple spinning systems are in use to produce satisfactory yarns from 100% dyed or white matt standard "Courtelle." The bulk of yarn produced at Westcroft Mill has been processed on standard Bradford open drawing with or without Raper Autoleveller and spun on conventional cap or ring spinning frames.

When drawing 100% standard "Courtelle" the fibre gives no difficulties and no recommendations are made for the addition of oils or anti-static agents, except in unusual circumstances when some dyed lots may exhibit obvious signs of static. In such cases a small percentage of an anti-static agent may be added.

The drawing details in Table 4 have given satisfactory results on commercial weights of yarn.

A further set of drawing particulars this time based on a shortened system using Raper Autoleveller gill and draw box is given in Table 5. Again these settings have given consistently good results over the last two to three years. The total number of doublings for the conventional system is 1728 and 216 for the Raper. The standard of long and short term irregularities for identical count yarns produced by the two systems have been compared on the basis of large weights of spun yarn from each. The criterion for long term has been variation between 80 yd. hanks, i.e. counts, and the criterion for short term variation at 1 cm. 5 in. and 50 in. lengths as tested on the Fielden evenness tester. There were no significant differences in short term irregularities between the two and long term count variation was satisfactory with both systems.



"Courtelle" staple being processed on the Noble comb

Worsted spinning frames

The details set out in Table 6 are given on information from one customer using this more specialised form of drawing but should indicate that drafts and doublings are standard as with wool drawing except that one operation is dispensed with.

French Drawing

Table 7 shows a typical French drawing for 100%, 4·5 den., 4 in. standard "Courtelle."

Spinning

The spinning performance of standard matt "Courtelle" is invariably satisfactory with both dyed and white materials and the ends down rate is very low due mainly to the strength of the fibre. Some fly is evident during spinning but on a percentage weight basis this is fractional. The figures shown in Table 8 are given as a guide and were taken from commercial weights in the shades stated in 1/36's worsted counts in each case. 4·5 den. 6 in. matt standard.

The highest breakage rates i.e. 6·0 per hundred spindle hours are satisfactory for worsted yarn. These spinnings on 6 in. material were carried out from a 6 drs. roving using a 7 in. ratch at 6,600 r.p.m. on a cap frame. The types of frames used at Westcroft Mill are:—

Anglo-Continental System

Table 6

Machine	Doublings	Draft	Top 320 drams per 40 yards. Weights of Sliver Delivered.
1st gill box	12	6·0	640
2nd gill box	3	6·0	320
3rd gill box	3	6·0	160
1st A.C. drawing box	2	4·0	80
2nd A.C. drawing box	2	4·0	40
3rd A.C. drawing box	3	4·0	30
1st A.C. cone box	2	4·0	15
Cone reducer	2	5·0	6

(1) Ring frames (Prince-Smith and Stells) normal tumbler control with three lines; 7 in. ratch, 2½ in. rings 7 in. lift, 6,000 r.p.m. spindle speed.

(2) Worsted cap frames 3½ in. pitch. Cap size 1⅞ in. dia. 5⅜ in. long 6 1/16 in. overall length, bobbin 1⅛ in. dia. ends. 4½ in. traverse. 4⅞ in. overall length. 6,500 r.p.m. spindles

Twisting

No difficulties occur in this process using standard cap or ring twisters. Allowance should be made for the bulky fibre when calculating the yardage per bobbin.

Table 7

	Doublings	Draft	Weight of Product (Drs./40 yds.)	Porcupine Setting Ratch (in.)
1st gill box (Speed-o-Gill)	4	5·6	228	
2nd gill box (Speed-o-Gill)	4	6	152	
3rd gill box (Speed-o-Gill)	3	6	76	
1st draw box	2	6	25·6	2½
2nd draw box	3	6	12·8	2¼
3rd draw box	3	5·5	7	2

Drawing from a 320 drs./40 yds. top for spinning on an apron draft spinner, e.g. Megaflex from a 7 drs./40 yds. roving.

Table 4

	Doublings	Draft	Top Weight 320 drams/40 yards. Weight of Sliver from Machine.	Ratch
Can gill	6	5·8	330 dram/40 yds.	(3 den. 4 in.)
Spindle gill	4	6·0	220	8½ in.
Weigh box	4	6·3	140	8 in.
1st finisher	3	6·4	65	7 in.
2nd finisher	3	7·8	25	6 in.
Reducer	2	8·2	6	

These figures apply for 3 den. 4 in. and 4·5 den. 6 in. standard "Courtelle" tops.

Table 5

Processing Details for 4·5 den. 6 in. Standard "Courtelle" or Slubbing Dyed Material from 2½ oz./5 yd. Top

Raper Autoleveller Can Gill

Ends	Draft	Delay Wheel	1¼ in. Roller	Weight off Box
12	5·5	45		700 drs./ 40 yds.

Raper Autoleveller Draw Box

Ends	Draft	Twist	Ratch	Weight off Box
1	5	Approx. 0·25 t.p.i.	8 in.	140 drs.
1st Finisher				
3	7	Approx. 0·42 t.p.i.	8½ in.	60 dra./40 yds.
2nd Finisher				
3	7·2	Approx. 0·8 t.p.i.	7½ in.	25 drs./40 yds.
Reducer				
2	8·3	Approx. 1·84 t.p.i.	7 in.	6 drs./40 yds.

For up to 40's worsted counts.
Re-rove to 3 drs. roving for above 40's.

Twists

Table 9 serves as a guide to the type of twists employed in two-fold weaving yarns for Bradford trade. With single machine knitting yarn for jersey outerwear a firm handling garment is required and a fairly high spinning twist is employed. Courtaulds in fact employ the above spinning twist plus one extra turn.

Table 8

Shade	Average R.H. %	Ends down per 100 Spindle Hours	% Spinning Board Waste
Navy	43·4	3·23	0·14
Beaver	42·4	0·45	0·10
Grey	38·0	6·00	0·14
Pistachio	45·0	1·55	0·14
Cerise	34·0	2·00	0·10
Light Beige	55·2	0·48	0·10
Sky	50·4	0·96	0·06
Alabaster	43·8	2·77	0·15
Midnight Blue	49·3	0·47	0·09
Hyacinth	47·6	1·92	0·09
Light Green	43·8	1·85	0·08
Blue	47·0	6·00	0·10

Winding

Clearing of the yarn should be carried out if it is intended for machine knitting and for this purpose an open set comb clearer at 0·035 in. has proved satisfactory for 1/36's count. The yarn is also waxed using standard or power driven waxing units. Experiments have been carried out using liquid wax in an emulsion form applied from the condition roller trough in a series of percentages to see if any advantages were obtained. The pick up of wax was heavy, but the laying of surface fibre did not improve to the extent expected and of course waxing is only carried out for that purpose. The increased rigidity of the yarn led to some stitch trouble at the knitting machine manifested by the bursting of the fabric into tiny holes.

Jersey yarn is steamed to reduce snarling from lively yarn and it has been found to be advantageous to carry this out on cone immediately prior to despatch. A fully automatic autoclave is useful instead of a

(above) Warping from cones

(left) Cone winding "Courtelle" yarns

Table 9

Counts	Single Twist	Two-fold Twist
2/24	10	9
2/28	11	10
2/30	12	10¾
2/32	13	11¼
2/36	14	12
2/40	15	13
2/48	17	16

traditional steaming oven (the latter is used however with good results) as the final evacuation by vacuum dries off the paper cones and surface moisture from the yarn. "Courtelle" yarns are not conditioned at the winder but "Courtelle"/wool blend yarns are, and the condition roller should run fairly fast against the direction of the yarn, to allow for the hydrophobic nature of the fibre.

"Courtelle"/Wool Blends

The preparation of "Courtelle"/wool blends can be carried out by two methods of sliver blending. The first is by blending the fibres in the desired proportions by extra gilling operations prior to the standard drawing process; the second is by recombing a blended sliver which has been produced by two gilling operations. The choice depends upon the end use and to a lesser degree upon cost. If the final construction woven or knitted is to be left undyed or dyed to a solid shade then either method can be used but gill blending would be preferable on a cost basis. If the "Courtelle" and wool are differently coloured, e.g. slubbing dyed mixture shades, recombing is recommended.

When preparing the blends care should be taken to ensure that the scale weights are corrected for any deviation from the standard moisture contents of the materials, and it is recommended that the weighing up should be done in sets of approximately 200 lbs. per set. Each set should be run out completely from the first blending gill-box before the second set is introduced and so on. In this way the blend level can be maintained over large weights of material. A typical gill blending and open drawing plan for the production of 6 dram/40 yds. roving from a blend of 50% 3 den. 4 in. standard "Courtelle" and 50% 64's wool, is given in Table 10.

"Courtelle"/wool blends are easy to process and the blends are appreciably stronger than 100% wool yarns in both wet and dry state. The greater the percentage of "Courtelle" in the blend the higher the strength of the yarn. Spinning twists are usually decided on the basis of spinning performance. Higher drafts can be used than is usual with all wool.

ACKNOWLEDGEMENTS

The author thanks Mr. C. Howden, A.T.I., and Mr. A. P. Smith, A.T.I., for their assistance in compiling this article.

Table 10

Operation	Doublings	Draft	Twist T.P.I.	Ratch	Drams/40 yds.
1st gill box	3 ends Wool 3 ends "Courtelle"	5·00	—	—	310
2nd gill box	5	5·20	—	—	300
Can gill	5	5·20	—	—	290
Spindle gill	5	5·20	0·15	—	280
Weigh box	3	6·25	0·23	7·25	134
1st finisher	3	6·75	0·42	6·75	60
2nd finisher	3	7·50	0·80	6·50	24
Reducer	2	8·00	1·75	6·25	6

Trade Literature

"TERYLENE" IN INDUSTRY. An excellent well-illustrated booklet from I.C.I. Ltd., Imperial Chemical House, Millbank, London, S.W.1., reveals some of the very important parts which "Terylene" plays as an industrial fibre. Giving the mechanical and physical, etc. properties, and several other features, the booklet provides valuable help on the uses of "Terylene," including sewing threads, protective clothing, conveyor belting, "Terylene"/cotton tarpaulins, life rafts, hoses, coated fabrics, ropes, nets, lines, filter fabrics and laundry etc., cloths.

* * *

NEW STYLE PRODUCT BOOKLETS. The first two product booklets in a new group style have just been published. Both are for products of Laporte Chemicals Ltd., P.O. Box 8, Luton, Beds: Renklens and Lapotex P.C.

The booklets have a large brightly coloured panel on the front cover and the text is set in Walbaum. A list of group companies appears on another coloured panel on the outside back cover.

Other Regenerated Fibres

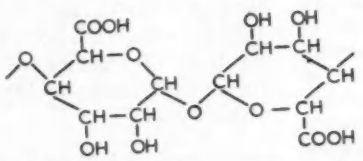
Production and properties of calcium alginate and regenerated protein fibres, their uses and limitations in woven, knitted and felted constructions and further possibilities

By J. W. S. HEARLE, M.A., PH.D., F.INST.P., F.T.I.*

THE vast bulk of regenerated fibres in use to-day derive almost entirely from natural cellulose in wood or cotton. But two other natural sources of natural fibre-forming materials are used to a small extent: these are proteins and alginates.

Alginate Fibres

Alginic acid, which can be obtained from seaweed, has a chemical structure very similar to cellulose. The only difference is that the hydroxylic—CH_2OH groups are replaced by the more oxidised carboxylic acid —COOH groups:—



Alginic acid and various metallic salts of the acids can be turned into fibres. The one which is used commercially is calcium alginate. These calcium alginate fibres, whose properties are summarised in Table 1 and Figures 3 and 4, can be dissolved away by washing in warm dilute solutions of washing soda or sequestering agents such as Calgon. Alginate yarns are therefore used where yarns are not required except temporarily, to help in manufacture.

A typical example is as a linking thread in hosiery manufacture. About five courses of alginate yarn link the two socks together, allowing production to run continuously; and this may subsequently be cut or ripped to separate the socks, and then washed away. The advantages of this are shown in Fig. 1. Other examples of the use of alginate yarns are as a scaffolding thread in weaving extremely lightweight woollen and worsted fabrics; for missed thread effects in dress fabrics; for lace effects, by embroidering on an alginate fabric which is then washed away; and to assist in good fringe formation in the manufacture of scarves.

Calcium alginate is haemostatic (blood-clotting) and so when suitably purified and modified is used for surgical and dental swabs, plugs and dressings. The price of alginate staple fibre is 162 d./lb., and it is also available in continuous filament yarns from 50 to 450 den.

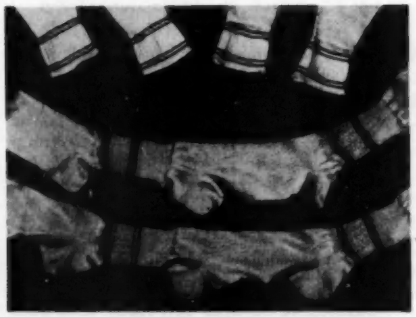
Table 1. Fibre Properties

	Calcium Alginate	"Fibrolane"
Tenacity g./tex.	17	9
Breaking extension, %	7	65
Work of rupture, g./tex.	—	1·6
Initial modulus, g./tex.	—	220
Elastic Recovery from:—		
Half breaking load	—	50
Half breaking ext.	—	45
Wet strength / Dry strength × 100%	30	40
Density, g./c.c.	1·8	1·3
Moisture regain at 65% R.H. ..	—	13

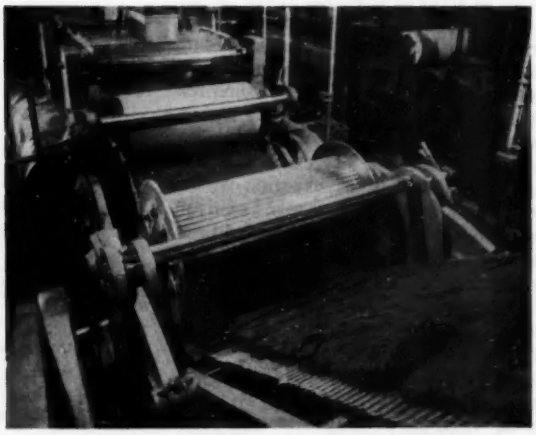
Regenerated Protein Fibres

Wool, hair and silk are natural protein fibres, and they can be dissolved in appropriate solvents and then spun into man-made fibres. In principle, one could conceive of this being a use for waste wool fibres or short hair fibres, but in pratice it has not been economically attractive. However there are other proteins which are fairly cheaply available as by-products of other manufacturing processes: for example, casein from milk, after extraction of fat for

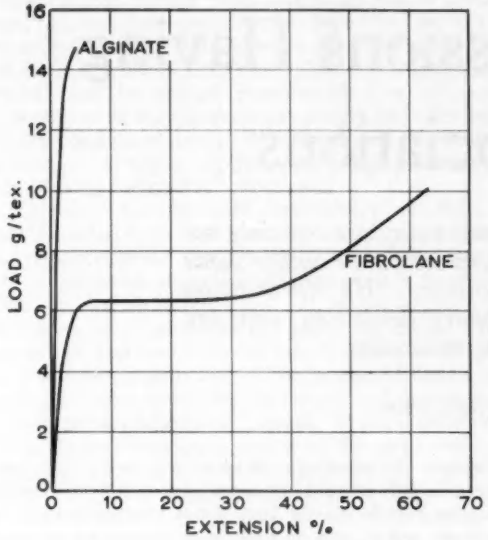
* *Manchester College of Science and Technology.*



(left) Fig. 1. Use of alginate yarn in hosiery manufacture (a) socks linked with alginate showing perfect welts (b) socks linked in the usual manner, having imperfect welts



(right) Fig. 2. One of the stages in the production of "Fibrolane"



(left) Fig. 3. Load-extension curves for alginate and "Fibrolane"

(right) Fig. 5. Early stage in constructing a crash helmet, the core of which is made from a blend of "Fibrolane" and wool moulded to shape under heat

butter or cream; zein from maize, after extraction of starch; and arachin from groundnuts after extraction of fats for margarine, cooking fats and soap.

These three are examples of globular proteins, that is proteins in which each long-chain molecules has coiled-up into a ball held together by cross-links between different parts of the same chain. But by appropriate heating or chemical treatments, they can be *denatured* so that the balls undo and the chains extend to give a fibrous protein. The solidification of egg-white is an example of this denaturing. After denaturing, the proteins can be dissolved and spun into fibres. In the past, all the above three proteins have been used as raw materials for fibre production—Vicara was made from zein in America, and Ardil was made from groundnut protein by I.C.I.—but now only casein is used: production of the other fibres has ceased. About 10 million lb. p.a. of casein fibres are produced of which by far the largest amount is the Italian casein fibres. Fibrolane (Fig. 2), was introduced by Courtaulds in 1937.

Regenerated protein fibres are non-crystalline; possibly because the molecules are designed in nature to coil into balls and not to pack parallel in a crystalline lattice like fibroin in silk or keratin in wool. This comparatively disordered structure gives a weak fibre. (Table 1 and Fig. 3) The breaking extension is high as in wool, but unlike wool the recovery properties for large extensions are poor. The fibres are very soft to handle, and have a moisture absorption similar to wool. They are irregular in cross-section, (Fig. 4).

Casein fibres, like the other regenerated protein fibres, are too weak to be usefully spun alone into yarns. The price of Fibrolane is about 42d./lb., more expensive than cotton or rayon but cheaper than wool. In blends with cotton, rayon, or acetate, casein fibres give added softness and warmth, fulness, and better recovery from creasing; in blends with wool, they reduce the cost, while retaining in the blend the characteristics of protein fibres; and in blends with synthetic fibres, they give warmth and moisture absorption. An example of the use of Fibrolane is shown in Fig. 5.

The properties of regenerated protein fibres are marginal for textile use, and it seems unlikely that production will ever rise greatly beyond the present low level. However the fibres are useful in some applications and a small demand will continue.

(*photographs, Courtaulds Ltd.*)

Suggestion for Further Reading —

R. L. Wormell, New Fibres From Proteins. Butterworths' Scientific Publications.

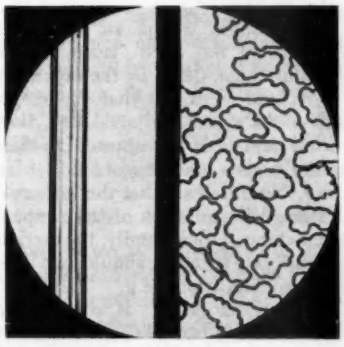


Fig. 4(a) Alginate

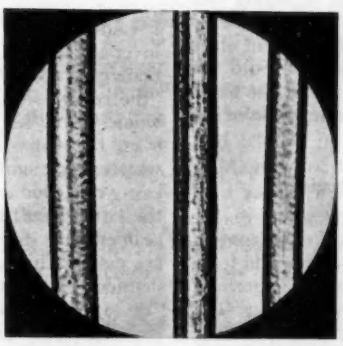


Fig. 4(b) "Fibrolane," 3½ den., 2½ in.

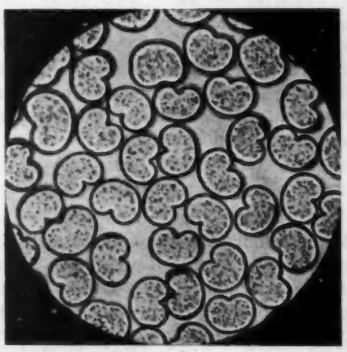


Fig. 4(c) "Fibrolane," 3½ den., 3 in.

Some New Expressions Having Textile Associations

Some of the expressions frequently heard today are certainly not as new as most people imagine and in this article the author shows that many have distinct textile associations. He also criticises some of the generally accepted dictionary definitions; some are vague and others quite misleading

By W. ENGLISH, M.Sc.(Tech.,) F.T.I.

IT is common knowledge that many everyday expressions are derived from textile sources, and quotations in the *Oxford English Dictionary* show how old some of these expressions are. Many who use these words and phrases are probably unaware of their textile associations or significance—e.g. "to be on tenterhooks." Yet tenter frames have been in use at least six centuries, and the earliest known use of the figurative expression occurred over 350 years ago. But there can be no such ignorance about the origins of the verb "to cotton." It is used to mean "to get together," "to agree together," and in the case of "cotton-up," "to make friendly advances." To "cotton-on" is apparently a much later introduction, but all these meanings seem to stem from a well-known characteristic of raw cotton—that of clinging quite tenaciously to other materials, especially to one's clothing.

"Shuttle service" is not as new as some may imagine. It was used as long ago as 1905 whilst a "shuttle train" was so described in 1891. The word "string" is found in many metaphorical phrases, from having a second to pulling a number of them. More recently we have been "stringing along" and we have also heard of agreements or arrangements being made "with no strings attached" or, more briefly, "with no strings." Somewhat similar expressions to the latter have been in use in the United States, however, for the last fifty years or so. To "get weaving" in the sense of "get going" seems to be fairly recent, but "weaving in and out" (say, of a crowd) is over sixty years old. "Fringe" has long been in use as a figurative expression as referring to irrelevant matter, but "lunatic fringe" has not been quoted. "Jeans" are described in an addendum as "overalls, latterly slacks." But today they are anything but *slacks*! As textile-minded people know, the term originated from the fact that these garments were originally and often still are made from fabrics known as jeans. It did *not* originate, as the uninformed might imagine, from the name of the first girl to wear them, as happened in the case of the long out-moded bloomers!

Words About New Textile Materials

The outstanding development of recent years in the textile industry has been the introduction and development of man-made fibres. The fabrics and garments made from these have become very popular, and although it is perhaps too early to expect figurative phrases to have been evolved from them, there are a number of words which have been given new meanings. "Nylons" immediately comes to mind. From being the name of a new synthetic material, and because the yarns spun from it were in the early post-war years largely knitted into stockings, so the word became a synonym for these. At first, the word meant stockings made from nylon, and as such it is mentioned in recent addenda, but it has now become almost a generic term, and one reads and hears such contradictory expressions as "rayon nylons" and even "silk nylons."

Another word which has come into general use in this country and which is also connected with stockings and with the newer fibres is "sheer." As every woman knows the word denotes transparency or gossamer-like appearance, and it is generally applied only to stockings. The word in this sense has a curious history, for it seems to have been so used in this country in the sixteenth century, being derived from the German "schier," a very fine lawn fabric. It lost this meaning, but recovered it later in the U.S., as is indicated by a quotation from a dictionary published in that country in 1848. Half a century later its use with this meaning was still looked upon as American, for the *Daily Chronicle*, in an issue in 1904, wrote of a garment, "So fine (the American girl would say sheer) is the batiste or lawn used that a slip lining is necessary." The word would naturally be applied in the States to the very fine and almost transparent stockings which began to be made from fine denier nylon yarns and would be quickly taken up here by the vendors and advertisers of ladies' hose. A recent addendum quotes the use of the word as a noun, i.e., as the name for a diaphanous textile material, but it is doubtful whether such a use of the word is anything but an occasional oddity.

About Seams

Ladies' hose has also brought about an interesting inversion in the implications of the word "seam." After many years of the associations engendered by the expression "the seamy side," it is natural to expect that "seamless" would imply high quality. As applied to stockings, however, the opposite prevails and it is the seamed stocking which represents quality, the seamless kind often being regarded as inferior. So much so, that the makers of the latter insert false "seams" in imitation of the properly seamed, fully-fashioned stocking. (Incidentally, the dictionary defines this as a "seam," but surely it should not be so defined without some qualification—e.g. "false" or "imitation" seam?) The explanation is, of course, that only the "fully-fashioned" stocking can be shaped to fit the leg by the taking up or dropping of stitches, because it is knitted as a flat fabric, which of course must be sewn

afterwards into tubular form. Stockings *knitted* in tubular form, i.e., seamless, cannot be so shaped and are therefore not so well-fitting. But ideas are again changing. Nylon and other new fibres are thermo-plastic, and so the knitted "tubes" can be shaped permanently (for all practical purposes) to fit the leg almost as snugly and effectively as the fully-fashioned hose. But the stigma of "seamless" remains, so with true psychological insight advertisers are now offering "seam-free" stockings!

"Drip-dry" has obviously come to stay, and there is no need to enlarge on the meaning of this expressive and easily-spoken term. But "bulked," to describe the loose, open construction of yarns made from some of the synthetic fibres, is not so often used. It is not a particularly descriptive term, so far as the public are concerned, and so may not pass into everyday use. Unless a better generic word is forthcoming, one of the registered brand names applied to these yarns and the fabrics and garments made from them may be adopted instead. Much depends on the simplicity and descriptive nature of the word, and on the amount of effective advertising applied to it. Actually, an example of this kind occurred some years ago, when a now well-known brand word was devised to describe one manufacturer's cut-filament rayon. It has become so popular that it is often used, erroneously, to describe other makes of the same kind of material and the yarns spun from them.

Spun Yet Not "Spun"

This example introduces another word which needs an additional definition—the adjective "spun" when used with words like silk, rayon and nylon. These materials are all produced by the extrusion of fine streams of viscous liquid, and these streams quickly solidify into fine, long filaments. The process is known as spinning, yet it would be misleading to describe the products as "spun"! The explanation is that they may be either converted into yarns by merely twisting together a number of these "continuous" filaments, or the filaments may be broken or cut into much shorter lengths and then processed in machinery in the same way that cotton and wool are processed and spun into yarns, and it is these yarns (and fabrics made from them) which are designated as spun (e.g., "spun silk," "spun rayon") to distinguish them from yarns made from continuous filaments.

Expressions applied to textile fabrics and garments are often borrowed from other sources, and understandably so. Thus it is obvious why a certain kind of defect in stockings is known as a "ladder." And it is possible that "pill" and the verb "to pill" may come into general use to describe another kind of defect in fabrics and in men's socks. "Pilling" is the formation of small beads or "pills" of tangled fibres on the surface of these materials, and is caused chiefly by a rubbing up of surface fibres during wear or washing. At present the word is mainly used in the trade, but the defect is known to many others, and the descriptive nature of the word "pill" is such that, as in the case of "ladders," it may come into general use before long.

Some Existing Definitions Criticised

And now a criticism of some existing dictionary definitions. That for "woollen" needs further clarification. As an adjective it is of course correct to define it as "made of or manufactured from wool" but it also has another though more restricted meaning. Woven wool fabrics may be broadly classified into (*a*) worsted, and (*b*) woollen fabrics. The dictionary is clear and even detailed in its description of the former, as being made from wool which has been *combed* before being spun into yarn, so that the fibres lie fairly straight and parallel. Woollen fabrics, using the adjective in the more restricted sense, are made from yarns which have *not* been combed. Consequently the fibres do not lie straight nor parallel, and so the yarns are rougher in appearance and to handle.

The dictionary does not, however, make this distinction, as is obvious when one sees that "worsted" is defined as "a woollen fabric." Presumably dictionaries provide definitions in accordance with the meanings applied to the words in everyday usage. But where a serious misunderstanding might arise, is it not advisable to draw attention to this possibility and even to suggest a means of avoiding it? Thus in the case of "woollen" (adj.) the word could be defined primarily in what is now its more restricted sense, with a note to the effect that it should not be used to describe *any* fabric or garment made of wool—the adjective "wool" should be used instead ("flaxen," i.e. made of flax, does not present the same confusion since it does not have the more restricted meaning, nor is there any difficulty where by implication the word indicates a colour—e.g., flaxen hair). Surely, too, the dictionary is wrong in stating that woollen as a noun is now rarely used? Certainly in the plural its use is quite common, and when so used it refers to the non-worsted fabrics mentioned above.

Carding is *not* Combing

Further clarification would result if the word "card" (v.) were given a more precise definition. At present it is defined as "to cleanse, comb, get into order," and it is this association of carding with combing which is confusing. Surely in combing one visualises a row or rows of teeth which penetrate into hair, fibres, etc. Carding, however, as every textile man knows, is a surface action. In fact, two surfaces are involved, each covered with wire teeth so closely set that they act on the fibres only at their extreme points. The two surfaces, brought closely together, and moving in relatively opposite directions, disentangle the mass of fibres between them. The action does not to any great extent straighten or parallelise the fibres, hence the rough hairy appearance of yarns such as woollen yarns, which have been carded but not combed. This same lack of distinction between carding and combing is present in a quotation under "woollen," which states that "scribblers" (a form of carding machine) are for "combing or preparing wool."

Finally, there is the word "textile" itself. Here too much importance seems to be given to the derivation of the word —i.e., its association with weaving. True, after defining "textile" (n.) as a woven fabric, the words "or any kind of cloth" are added. (Yet under "shawl" one finds the words "any textile or netted fabric.") But today the word has a still wider meaning and includes threads, ropes, net, lace and felts.

Mention of felts brings to mind another new meaning to a word. Felts are fabrics which are made by matting together certain kinds of wool and fur—neither spinning nor weaving has been involved in their manufacture. Today many other fibrous materials are formed into fabrics on the same underlying principle, with the aid of adhesives. Collectively they are known as "bonded fibre fabrics," and future dictionary definitions of the word "bond" should make some reference to this development.

The Impact of Modern Machinery on Weaving in the West Riding*

The new machines need technicians—not machine tenters—and the innovations to old machines and methods require skills still foreign to many in the industry

By M. W. TOWNSEND, B.A., F.INST.P.†

ALTHOUGH there may be no need to justify the discussion of such a topic to any enlightened audience, current events underline its importance. The competition that the industry is experiencing from other countries—woollens from Italy, fine worsteds from Japan—is not entirely due to economic factors; technical competence and innovation are much in evidence in foreign products. These factors must be associated with the emergence of other fabrics now competing with woven goods; double jersey cloths produced at the rate of 80 yd./hr. compared with 20 yd./hr. for the most modern weaving machine; non woven fabrics "stitched" at speeds of 110 yds./hr. in the same equivalent width, with disposable non woven trousers on sale in the U.S. at 3/6 a pair and jackets at 4/- each. It is time for the weaving industry to take stock of the future.

In order to keep pace and in advance of the technological progress of his competitors the manufacturer is constantly aware of two requirements: to reduce the costs of his products and improve their quality. The importance of cost needs no emphasis; essentially it can be reduced by using machinery with a higher rate of production, and machinery that requires a lower input of labour to keep it running. The effect of quality is sometimes disregarded. Not only is it vital for continued and increased sales appeal but it is also a significant factor in total cost. The present complement of some 26,500 weavers in our industry is associated with the need to employ some 15,000 menders; approximately 7,000 of these are engaged in repairing cloth damages made at the loom. The need for automatic devices that can supplement the skills of our weavers and detect these faults before they are "woven" becomes increasingly important.

At first sight there are now available many new types of weaving machine that meet the requirements of higher production speeds or lower labour requirements; many of them indeed combine the two. The technological developments leading to these achievements have been in two main directions. First, is the achievement of higher speed by eliminating from the loom the massive sley with its many shuttle boxes, and by dispensing with the dobby. The replacement of the shuttle by other means of weft insertion is, in my opinion, only important in this context in so far as it enables the sley to be reduced in weight.

Flexibility

The second step concerns the shuttle directly and embraces all those means, such as rapiers, bullets, jets, and automatic weft supply, that eliminate or greatly reduce the need for reshuttling and battery filling. Many of these machines are, however, not suited to the woollen and worsted industries; the conventional cry for versatility in the wool loom, to weave many colours of weft, picking-at-will, with a variety of shedding possibilities, becomes of greater importance. To continue its success in the export field the industry must concentrate on those quality and beautiful fabrics of which it is such a master. This necessity rejects immediately all those machines that are restricted to one colour of weft. But several remain that can be useful. Notable in this field are the well-known Sulzer machine, the Dewatex rapier loom (not yet used in the U.K. to my knowledge) and some of the circular weaving machines. All these combine a higher production rate than the conventional loom with much larger weft packages, and some degree of versatility in picking and shedding.

Relative to the price of a conventional loom these new machines are very expensive, varying in cost from £3,000—£4,000 each. The ability to justify such a large capital outlay is certainly not the sole criterion on which a manufacturer will consider their installation, but it is an important one. Such an economic assessment of their worth can be based on the savings that the machines achieve in the weft winding and weaver costs, and on their high rates of production which reduce the number of machines required for the same output as conventional looms.

Calculations of this sort are very general but do reveal some useful trends. They suggest, for example, that if the new types of machine are only run on single shift, and if the conventional looms can be run at four looms/weaver the extra cost of the new types relative to the cost of new conventional looms would take more than 10 years to recover; reducing the number of new types required by running them on double shift would reduce this recovery period to two years when weaving long warps, but the period would be considerably greater for single cut weaving. This effect of the warp length on the efficiency and so on the relative advantage of high speed machinery is very relevant to the specialised sections of the industry because most of their warps are short. It is, however, perhaps pertinent to remember that when in a few years a competitor has written off the cost of these new machines he will be able to weave short warps more cheaply than a manufacturer with conventional looms.

Deciding Factors

The use of new weaving machines is not, however, the only step that the manufacturer can take to improve productivity. Improvements to conventional systems become available at an increasing rate, and many are applicable to the versatile machine that the industry requires. Foremost amongst these developments are the use of much larger weft packages in conventional shuttles coupled with semi-automatic attachments, the WIRA full-width temple, the development of push-button operation for controlling the loom, and the development of automatic warp preparation machinery. Courageous use of such innovations can place the conventional loom in a very strong position.

The manufacturer has then three choices: (*a*) invest a large amount of capital in such new machines as will weave his cloths, on the understanding that they can, for the time, only be economic on relatively long warps and double shift weaving (*b*) carry on with traditional looms and methods relying on skill in design and technique, with the risk that in a few years he may be priced out of his market or (*c*) adopt such new innovations as are available for conventional looms to improve their productivity and the quality of the goods they produce.

The effects of these new machines and methods are already being felt by the industry, and this impact will not decrease. The requirements that the new weaving machines raise for particular types of large weft package, the long and heavy warp beams that the machines are most suited to, and the preference that they create for yarn that will weave at high efficiencies, severally suggest an increasing trend to vertical factory groupings. The cleanliness, quietness and ease of handling that the weaver associates with the new machines will be accompanied by an antipathy to the conditions of the conventional weaving shed. The supply of labour for conventional looms will not thereby be eased.

To meet these problems, and to meet the demands of the new machines themselves, certain steps are required by the industry, and of the loom makers that supply it.

(*continued on page 319*)

* *A paper given recently to Halifax Textile Society.*

† *Principal Scientific Officer, Wool Industries Research Association Ltd.*

Ceramic Fibre—Seven Forms and How To Use Them*

By C. B. WALWORTH†

Many prefabricated forms have been developed since strong, lightweight aluminum silicate appeared several years ago. How these various design forms are used in current high temperature applications is dealt with in this article

ORIGINALLY developed for jet engines, aluminium silicate fibre has become important for many other applications where design requirements call for a high temperature resistant (1,000 to 2,300°F.), lightweight, strong, fibrous material with low thermal conductivity. It is used for a variety of high temperature applications, including thermal, acoustical and electrical insulation; filters; and packings and gaskets. Originally available in fibre form only, the material is now available in a variety of prefabricated forms, each of which provides maximum design effectiveness for specific applications.

One of the major uses of aluminium silicate fibre in bulk form is high temperature insulation. Applications include furnace hot-topping, heating element cushions and jet engine blankets. The bulk fibre is also used as an expansion joint packing in kilns and furnaces to reduce heat losses and help maintain uniform furnace temperatures. In an early application, short staple fibre was packed as a lining for stainless steel cans used as combustion tubes in gas- and oil-fire turbines.

Furnaces and Filters

Short staple fibre is used in place of asbestos in continuous brazing furnaces to cushion aluminium and copper parts. Use of the material results in lower maintenance costs and longer life; the aluminium silicate fibre withstands 150 trips through the brazing cycle compared with two or three cycles for asbestos. Many of the insulation applications for which bulk fibre is used also require that the insulation be vibration resistant, i.e. fibres must not be shaken loose during service. Long staple fibres provide better vibration resistance than short staple. This improved vibration resistance is an important requirement when bulk fibres are used for insulating rolls that convey steel and alloy sheet metal through annealing furnaces. These rolls are normally fabricated by assembling a series of refractory cylinders on a long, water cooled, steel tie rod; pressure is applied at each end of the roll to hold the refractory cylinders under compression. Long staple aluminium silicate fibre is used as a bulk packing inside the rolls to protect the rod from heat built-up in the refractory roll surfaces.

Filters and Air Conveyors

Long staple aluminium silicate fibre is used to filter gases in the 1,400°F. range. Coarse, medium coarse or fine grades, or composite of these grades, can be specified to obtain the desired filter characteristics. Filter efficiency and resistance for long staple fibre in bulk form are shown in Table 1. Batts are formed by bulking the fibre into a blanket-like shape, which is held together mechanically with wire or similar fastening device.

When conveying extremely hot materials, the fibre in batt form is placed in the bottom of an air chamber. Hot solids from roasting or calcining operations are fed into the upper part of the chamber, and air passing through the fibrous batt keeps the solids suspended for transfer to other processing areas. The air may also serve to cool the solids. The fibre batt is suitable for such uses because of its high temperature resistance, its air permeability, and the fact that it does not deteriorate when hot suspended solids are deposited on the batt during shutdown.

Applications for paper made of aluminium silicate fibre include high temperature linings, filters, gaskets, fabrication aids and electrical applications. Electrical uses should grow because of the inherent combination of good electrical insulating properties and high heat resistance. The paper is available in thicknesses of 20, 40 and 80 mils. Papers less than 10 mils thick suitable for applications such as wire and coil wrapping are difficult but not impossible to produce.

Linings and Gaskets

The thin gauge and low thermal conductivity of such papers make them useful high temperature lining materials. Many non-ferrous metals, such as aluminium, magnesium and some brasses and bronzes do not readily wet or attack the aluminium silicate fibre. Thus paper made from the fibre can be used to line metal ducts, ladles, crucibles, spouts, launder systems, ingot moulds, and other metal components used to handle these molten metals. The paper is also used as a lining for combustion chambers in oil-fired domestic heating units. The paper protects the steel wall of the chamber from direct flame impingement.

The paper is used for gaskets on pressure vessels, flanges, orifice blocks and other equipment that encounter high temperatures and make use of moderately low pressures. Because of the relatively high porosity of the paper, it can be impregnated with silicones, fluorocarbons and similar heat-resistant impregnants to adapt the paper to higher pressure gasket applications.

The paper can also be used as process and fabrication aids. It is used successfully as a brazing cushion in making brazed stainless steel honeycomb sandwich structures. Dimensional stability and inertness are primary requirements.

Table 1. Filter Efficiency and Resistance*
(Long staple fibre)

Type of Fibre	Filter Depth, in.	Packing Density, lb./cu. ft.	Gas Velocity, f.p.m.	Gas Temp., °F.	Filter Res., in.H_2O	Dust Loading, gm./1,000 cu. ft.	Weight Efficiency %
Coarse	4	2.....	400	70	1·2	9·2	85
		3.....	400	1,400	1·7	20·3	83
		2.....	700	1,400	1·4	16·3	82
Medium Coarse	1·5	3.....	350	70	1·7	30·1	99
		3.....	400	1,000	2·2	33·9	94
		3.....	700	1,400	—	16·4	84
Fine	1	2.....	350	70	2·4	36·8	98
		2.....	400	1,400	2·3	34·3	91
		2.....	700	1,500	3·7	6·6	85
Composite†	—	3.....	400	70	5·1	13·1	99+
		3.....	400	1,400	5·3	10·8	99+

*** Aerosol used was technical grade cupric oxide; median particle size was 8·5 microns.**

† Composite filter contained 5 in. of coarse fibre, 1 in. of medium coarse fibre, and ½ in. of fine fibre.

† *Senior Engineer, Research and Development Division, Carborundum Co.*

* *With acknowledgements to U.S. Industrial Digest.*

Table 2. Typical Breaking Strengths of Aluminium Silicate Textiles (lb.)

Type of Textile	Base Weight	Normal	After 24 hr. at 1,000°F.	At 1,500°F.	At 2,000°F.
Rope (½ in.)	30 ft./lb.	80	—	—	—
Rope (¼ in. with nickel-chromium wire insert)	46 ft./lb.	300	—	—	—
Cloth (twill weave)	32 oz./sq. yd.	44	7	6	—
Cloth (Plain weave with stainless steel wire insert)	26 oz./sq. yd.	53	27	25	—
Cloth (double weave with wire insert)	55 oz./sq. yd.	168	—	97	—
Cloth (twill weave with nickel-chromium wire insert)	40 oz./sq. yd.	117	96	72	52

Oil-fired Furnaces.—The blocks are used to line the combustion chamber of an oil-fired furnace. Use of the blocks reduces slag build-up on the chamber wall, and little if any erosion from direct flame impingement occurs. The lightweight block also eliminates the need for a forced air "after purge" of the furnace. Purging is now done entirely by bleed-down of the primary air pressure chamber and by natural draught through the secondary air control damper and blower.

Tunnel Kilns.—The good resistance of aluminium silicate blocks to thermal shock is of particular advantage when the blocks are used as roof tiles in tunnel kilns. Tunnel kiln operations occasionally involve jam-ups because of movement of skidrails or ware-supporting setter plates. Usually substantial production time is lost waiting for the kiln to cool slowly in order to avoid fracture or spalling of the insulating brick. Kilns insulated with aluminium silicate block can be cooled more rapidly because of the material's superior thermal shock resistance. Also, the block can be re-used after the tunnel has been dismantled and the jam-up straightened out.

Electric Furnaces.—Blocks are currently used to line electric furnaces (4 to 6 ft. dia. and 10 to 15 ft. long) that are used to form graphite tubes. The blocks are cut into 6-in. wide strips and pressed or bevel-cut to fit the inside contour of the steel vessel. The blocks provide effective insulation while maintaining a furnace firing temperature of 1,650°F. (± 70°F.) for several days. The blocks have provided satisfactory service for several years of operation without deteriorating in either oxidising or reducing atmospheres or after contact with pitch vapours and sulphur gases.

Textiles

Several types of high temperature resistant textile products have been developed in the last three years. These products, made from long staple fibres, include blankets, roving, yarn, rope, tape and broad woven textile goods. Table 2 lists typical breaking strengths of several of these materials. Yarns reinforced with glass filaments, alloy wire and other reinforcements have been produced experimentally.

Blankets.—Aluminium silicate fibre blankets are used as high temperature insulation in furance tops, sidewalls and ducts; turbine exhaust lines; and superheated steam piping. For piping applications the blanket is particularly well suited for insulating fabricated sections such as flange and valve covers and elbows. These insulations are usually assembled by encasing the blanket in a flexible alloy wire screen or heat-resistant cloth and stitching the assembly together. Removable coverings can be made up in this manner.

The degree of insulation obtainable with these blankets is indicated by an installation in an incinerator used to burn exhaust fumes generated in a paint spray operation. The blanket reduces a combustion chamber temperature of 1,600 - 1,700°F. to a safe level of 150°F. on the outside shell. Aluminium silicate blankets are also used as a packing between firebrick linings of a petroleum refining furnace. The firebrick expands and contracts with fluctuating temperatures in the furnace, and the blanket acts as an expansion joint filler as well as a seal against gas leakage.

Combination of aluminiums silicate blankets and glass fibres or asbestos materials offer interesting possibilities. The blanket is used to reduce the temperatures to a safe range for the glass or asbestos. A flange cover recently assembled by Philadelphia Asbestos Corp. for superheated steam piping reduces a hot face temperature of 1,100°F. to about 100°F. on the cold face through 2½ in. of aluminium silicate blanket and 1½ in. of glass fibre blanket. The resulting assembly is about one-half the weight of conventional insulation.

Other Textiles.—A number of applications are now being investigated for the other textile products. Among these are gaskets and seals in heat-treating furnaces, rope packings for moulds (between the hot top and the ingot mould) in steel manufacture, bag filters for collecting hot carbon and chemicals, and electrical wire winding and wrapping.

Drying Lids.—Castable aluminium silicate is used in a lid for drying and setting ceramic linings in casting pots. The lid is exposed to a temperature cycle of room temperature to more than 2,000°F. Burner blocks are mounted on the lid, and an air-gas mixture is burned to provide a heat source. In operation the castable surface is suspended over the casting pot and thus is in direct contact with the flame sweep during firing. Lids made of other types of castable refractories weigh between 1,500 and 2,000 lb. For an equivalent thickness, the aluminium silicate lid weighs only 350 lb.

Pressure Vessels.—The castable is used as a lining for pressure vessels. The lining is installed on the inner wall of the vessel, and conforms to the contours of the top and bottom, as well as the inlet and outlet ports. In one application, the vessel is designed to withstand 300 p.s.i. gas pressure at 1,500°F. The lining, applied 2 in. thick, permits the original 2-in. thick stainless steel wall to be replaced with a ¼-in. carbon steel wall.

Table 3

Typical Properties of Fibre Board

Colour	White
Density, lb./cu. ft.	25 - 60
Breaking strength (cross, ¼ in. thick p.s.i.	1,000
Shrinkage (after 24 hr. at 1,500°F.), %	0·4
Thermal Shock Resistance	Excellent

Moulded Shapes

Rigid, structural moulded shapes consisting of aluminium silicate fibres and high temperature binders have also been developed. Table 3 lists properties of a typical board. Several applications for these moulded products are being investigated. Among them are re-usable risers for non-ferrous casting—attractive because the riser would not be wetted by molten aluminium or magnesium. Also of interest: combustion chamber liners, baffles and flame deflectors, small furnace and oven liners, and can setter plates and shields. Corrugated sheeting serves as spacers in high temperature absolute filters and may be adaptable to base plates for relatively high porosity, can be impregnated ceramic fibre products, because of their relatively high porosity, can be impregnated by vacuum and immersion techniques with commonly available inorganic binders, as well as rubber, phenolic, epoxy and silicone solvent or latex-base materials. Electrical and physical properties of such composites depend to a great extent on the materials used for impregnation.

Future Applications

Smog Control.—It appears that much improvement in control of smog can be accomplished by incinerating waste materials at higher temperatures than are now customary. Even raw sewage when burned at temperatures above 1,400°F. produces no objectionable odours or air contaminants. Aluminium silicate fibrous insulation can provide sufficient protection to permit burning such waste at these elevated temperatures.

Filtration of Radioactive Particles.—The fibre is being evaluated for filtration of radioactive particles from hot gas streams. Results to date indicate efficiencies are sufficient to meet the rigid safety requirements of atomic energy work.

Missiles.—The lightweight fibre may solve many of the problems of insulation and resistance to erosion and thermal shock encountered in rockets and guided missiles.

Fire-resistant Products.—The extreme resistance to fire provided by aluminium silicate fibres suggests uses in manufacturing fireproof safes, files, desks and other office equipment, as well as fireproof panels for building construction and partitions.

Aluminium Silicate-Fibre: Properties

Aluminium silicate fibre has a melting point of over 3,000°F., and a maximum use temperature of 2,300°F. When exposed to

(*continued on page 319*)

Table 4
Electrical Characteristics of Fibre Board

Frequency, cps.	Temp., °F.	Dielec. Const.	Loss Tangent
10^2	Room	4·81	0·654
10^5	Room	1·75	0·040
10^8	Room	1·61	0·017
$1·4 \times 10^{10}$	Room	1·60	0·036
$8·6 \times 10^9$	266	1·57	0·0078
	590	1·569	0·0055
	930	1·560	0·0063

Work Study: Its Application to Wool Textiles*

Points dealt with in this paper include the problems encountered, also work flow, layout and handling; job method improvement; machine performances; departmental and clerical organisation; establishing standards and the introduction of incentives, and human relations

By J. G. REID, B.SC.†

THE complexities of running a wool textile business seem to grow rather than diminish, and all responsible for the production side have these problems:—

(1) Attracting suitable labour—and retaining it.
(2) Making the best use of the available labour.
(3) Getting the most out of the machinery installed.
(4) Making deliveries to time and keeping costs down.
(5) Maintaining quality to required standards.
(6) Deciding about re-equipment and other urgent matters.

These problems have always applied but under conditions of full employment, competitive markets and increasing pressure to progress there has been a steady growth over recent years in the employment of specialists to help management. This tendency will grow as the problems of operating a production unit become more complex. We have cost accountants, production controllers, quality controllers, training officers, personnel officers and the work study officer.

Management use these people to help in solving particular problems. They employ them because these specialists have the time to get down to the fact finding and problem examination which is essential if management decisions and action are going to be soundly based. This then is the way most managements would and should regard Work Study. There is another aspect of this subject which should not be overlooked. Work Study is an attitude of mind—a discipline which should apply to all problem solving. It is a technique which should be used in almost every situation where the correct facts must be obtained, the systematic analysis of these facts is to be made as a preliminary to making decisions in the development of improved working.

What then is the special nature of Work Study? There are perhaps three aspects which we would normally expect to be the province of those engaged in this type of work:—

(1) Improving methods and getting a more efficient organisation by a critical examination of current practice and a systematic development of improvements.
(2) Establishing standards which will give the expected rates of production, man-power requirements and also the basis for costing and control. This work will also come in the economic evaluation of new equipment.
(3) Introducing more equitable financial incentives by establishing a correct relationship between the reward and the work done.

Looking at Method Study first it has always seemed advisable to consider this under five main categories which, each demanding the common approach of systematic recording and critical examination of existing methods, none the less require their own special techniques and understanding.

Work Flow, Layout and Handling

Here we are concerned with the problems of the flow of work and materials from one process to the next and the layout of machines which will most economically achieve this, as well as the convenience of working from the operative's point of view.

In such problems the Work Study officer will make use of layout diagrams, process charts and similar devices to build up all the relevant facts about existing methods with a view of improving these. Those carrying out such investigations in this industry are well aware of the limitations there are to change in this direction. The average mill and the established nature of the processes do not readily lend themselves to improvements in work flow and layout. Old multi-storey buildings, originally built round a central engine and line shafting make it difficult to achieve large scale improvements without resource to closing down parts of the mill and re-grouping elsewhere. This is one reason for the limited use of costly handling equipment like fork lift trucks.

None the less significant improvements have been achieved by relatively inexpensive changes such as making alternative routes and access through existing walls or floors. The introduction of hoists and lifting devices together with chutes between floor levels have given much reduced physical handling between departments in multi-storeyed buildings.

The most widespread contribution which Work Study has made to handling problems in wool textiles has been in developing small trucks and containers for reducing the time for repetitive operations like creeling and doffing. The use of standard self-stacking containers interchangeable between operations should become more widespread with consequent saving in handling time and damage to material in process.

Job Method Improvement

Perhaps the most fruitful field for Method Study is in attention to the way in which the individual operative performs his work and the aids to making this easier and less tiring to do as well as more effective. Such investigation might, in rare cases, involve the use of fine scale motion study techniques such as micro-motion film analysis, but in nearly all cases

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* *A paper given recently to Batley and District Textile Society.*

† *Principal, Work Study Centre, The Wool (and Allied) Textile Employers' Council.*

improvements come about by more conventional recording and critical examination of existing methods.

In wool textile processes the important thing is to reduce machine stopped time by speeding the work of doffing and creeling. The work pattern employed by the operative can often be improved by changing the sequence and methods. Individual spindle, or sectional, doffing and creeling-in will give big advantages over the more usual system of stopping a whole machine side and dealing with it at one time, thus creating excessive machine idle time. Other improvements in the height and position of pegs and lockers will all help to reduce the time and effort for such work.

It is here that the new science of ergonomics can play a part. Designing the job to suit the operative and introducing ways of reducing the perceptial and physical load. Stop motions have made their contribution to this aspect of the operative's task for many years, but the wider adoption of such devices in say semi-automatic weaving, as well as the better design of the machines themselves for easier operation, is all part of the attention to job method. Work Study has helped to get improved performance in Mending rooms by better designed seating, tables and lighting.

Machine Performance

Those special aspects of method study which will increase machine performance by reducing the stopped time have great importance in wool textile processing. Mention has already been made of the part which improvement in job method can play here. Technical developments introducing larger packages in spinning, twisting and weaving aim at increased machine efficiency and extension of work loads, which will be discussed below.

Departmental Organisation

In many cases it is improvement in the departmental or mill organisation which is shown up as necessary through Work Study investigations. While accepting that this is management's province, nevertheless the systematic recording of hold-ups and determination of their cause together with proposals for changes in procedure is work which those carrying out Method Study in the industry will be often involved in. If reduction in lost time and better departmental performance is to be achieved then this will mean better production planning and machine loading. In fact many Work Study investigations result in reorganisation of the procedures for converting orders into manufacturing instructions, controlling stocks and tightening up on delivery promises.

This may involve the introduction of systems and in the large vertical organisation punch card equipment has proved well worth while. Such installations can only be done by a full appraisal, using the Method Study approach, of the problems to be solved and detailed attention to the procedure which would best suit them. On a smaller scale we have the many instances of organisation deficiencies such as shortage of bobbins, organisation of ancillary labour, poor machine maintenance and unplanned supervision which affects the effectiveness of both operatives and machines.

Clerical Organisation

The method study approach can often be profitably applied to the actual paper work procedures in a firm. This will involve charting and recording just what happens as the Work Study officer would do in any process investigation. The two main sources of paper work in the average wool textile mill will be in work recording and preparation of payrolls, and in the conversion of orders into manufacturing instructions with subsequent despatch advice and invoicing.

These investigations may suggest the advantage of introducing certain office equipment such as photocopyers for reproducing warping and weaving tickets, or simple filing and progressing devices. The layout and drafting of documents for ease of entry and collection of information must get attention under this heading.

Establishing Standards

The techniques of time study are still the subject of controversy but they have become far more widely accepted as the most satisfactory methods so far devised for establishing standards of productivity. In wool textiles work measurement is accepted as the best way of determining how long any task should take to perform and thus give indication of output rates and labour requirements for given levels of production. In many wool textile processes there arise special problems of work loading due to the predominance of what we call machine controlled working, that is where the operative has to work on several machines, either spindles or looms, and deal with random work elements occurring on these.

The relative importance of maximum machine efficiency as against maximum operative utilisation is an important consideration and work measurement is essential to establish these. The factors affecting allocations on operations like spinning, twisting and winding include the package sizes, both input and output, machine speed, count, work element frequencies such as repair breaks and the interference factor which arises when work elements can arise at random on more than one spindle or loom. Weaving is of particular interest at the moment because of the investigation being carried out by the Work Study Centre on behalf of the manufacturing section of the industry. This work is aimed at establishing the most satisfactory basis for determining work loads on multi-loom weaving and the corresponding relation between work load and payment. The investigation has shown the anomalies in traditional piece-work scales, and the imperative need for these to be replaced by a new system of payment as the introduction of new types of loom and semi-automatic fitments becomes more widespread.

Incentives

While the establishment of standards through work measurement is all important for such functions as planning and cost control it still remains as the fundamental basis for setting up equitable and sound financial incentives. Piecework which gives a direct relation between earnings and the work produced has been widely used in most wool textile processes for many years. The term may well have originated in this industry. Before the advent of the work measurement and time study technique most piecework rates were set up by management on a somewhat empirical basis, an estimate of what might be expected from the operative. This system suffers from many faults, the rates have often continued to apply even though changes in the work methods and process have occurred. They have usually been subject to various additions and make-up allowances not based on any sound determination of the factors involved. All this has led to anomalies and disparity in earnings.

Use of the work measurement technique enables the correct work loads to be established and the corresponding level of expected output to be worked out for all working conditions, e.g. for the full range of counts in twisting or winding taking into account the various package sizes, break frequencies and so on.

In most cases it is advisable to relate these expected productions, either weight or picks, to target earnings and continue to express the incentive in conventional piece work terms. The use of bonus schemes based on standard times is not very widespread in this industry, and in any event these schemes are established on exactly the same basis as piece work rates determined by work measurement. Most direct production operatives can be applied on an individual incentive basis but in a few departments like dye-houses and finishing there is much in favour of group incentives because of the team work nature of the work. Cloth mending produces special problems in applying incentives because the amount of work to be done on any piece is an unknown quantity. It is unlikely to be constant even on pieces of the same type and quality. For this reason an assessment of work content must be made by a skilled operative before passing on the piece for mending. Her assessment in terms of the various faults recorded is converted into the work content by applying the time standards established from the work measurement studies on all types of fault for various cloth categories. Once this work content is determined the appropriate price can be given to the piece. Such schemes have done much to cut out the troubles which arose from "good" and "bad" pieces as they were called by the menders when prices were established on the old basis.

What of the future as far as incentives. Some industries have dispensed with the direct relation between wages and production and substituted what are sometimes known as high task rates. This means using the Work Measurement techniques to set standards of output. Operatives are expected to attain these but earnings are fixed and do not fluctuate with individual output. Consistent failure to attain standard output is then a matter for supervisory attention, either by training or transfer. Such arrangements have the marked advantage of simplicity in application but seems to be far more suited to those industries such as car or confectionery manufacture where the individual on the conveyor can do little to influence output. In wool textiles we are still some way off the largely automated factory and financial incentives will continue as a very necessary aid to high productivity for some long time. The important thing is that such incentives shall be on the sound basis of proper work measurement.

Human Relations

Because Work Study is involved with the people at work and tries to improve methods or effect redeployment on existing processes there must be the inevitable problem of resistance to change. Some managements may shy off Work Study because of the difficulties which they anticipated these problems will bring. While a sound policy of communication and keeping people informed of proposed changes is essential there is no evidence that the application of Work Study is particularly difficult in this industry, despite its long established processes and labour force. In fact, an enlightened and progressive attitude on the part of the trade unions associated with wool textiles has done much to promote its acceptance.

Impact of Modern Machinery in West Riding

(*continued from page 314*)

From the industry, I suggest that a keener approach to the problem of technical training is vital. The new machines need technicians, not machine tenters, and the innovations to old machines and methods require skills that are still foreign to many in the industry. The machine makers must supply these technicians with much better instruction manuals than they normally provide. At the same time a concerted effort is needed to bring the conventional loom up to date to simplify the controls on it, to eliminate the sheer hard work that is needed to manipulate the dobby and the sley by hand, to make it quieter, and perhaps most important of all, to attend to those failures in loom design that cause avoidable faults in cloth.

To emphasise the need for improvement is not to imply that the industry is negligent of the steps that must be taken. The cynic may be reminded that the Sulzer machines seem to be going into Yorkshire factories quicker than into Lancashire, and in 1963 over 300 are expected to be weaving wool cloths; the semi-automatic technique, rapidly extending in application, is already in use on over 2,000 looms in Yorkshire, and the industry has been quick to take advantage of the WIRA full width temple, over 1,000 being already in use; and in spite of the demands that they make of a clever designer automatic looms are finding wider application: during the last 10 years the proportion of these has increased from 16% to 29%, and at least 37% of the industry's worsted looms are now of this type. Such are the symptoms of an industry confident of its ability to meet the new demands that modern machinery makes.

Ceramic Fibres: How to Use Them

(*continued from page 316*)

temperatures in excess of 2,000°F. for long periods of time, the material undergoes devitrification, i.e. the amorphous or random crystalline orientation changes to a definitely arranged pattern. This phase change makes the fibre more brittle, lower in tensile strength, and more easily abraded. There is also some indication of shrinkage. There is no evidence of melting at temperatures under 3,000°F.

Types Produced

Aluminium silicate fibres are produced either as short staple fibres, or as long staple, textile grade fibres. The long staple type is produced fine, medium coarse or coarse to suit individual uses. Short staple fibres are produced by passing the molten aluminium oxide silica (1:1 ratio) stream, which contains small quantities of sodium and boron to help control the melt, into a high velocity air or steam jet. The jet disintegrates the stream into very fine particles or droplets, and attenuates these droplets into fine fibres as they cool rapidly. The fibres are carried away by suction and collected for processing. Long staple fibres of controlled diameters are produced by a recently developed process in which small quantities of zirconia are added to control the melt. Coarser varieties are available for specific applications such as air filtration.

The fibre is prefabricated in a variety of standard shapes for specific end uses. The standard forms: staple fibre; bulk fibre; batts; paper; blankets and other textiles such as rope, roving, yarn and cloth; castable; and board and mould shapes. "Fibrefrax" is the registered trademark for Carborundum Co.'s aluminium silicate fibre and prefabricated forms in which it is available.

Technical Information

The following publications are now available from I.C.I., Ltd., Dyehouse Dept., Dyestuffs Division, Blackley, Manchester:—

No. 602. Procion Dyestuffs: Effect of Metal—Sequestering Agents in the Dyebath.

No. 622. Viscose Rayon, Dyeing and Resin Finishing: Modified Continuous Piece-Dyeing Procedures for Procion Dyestuffs.

No. 623. Dyestuffs Division Products Used in the Laundry Industry.

No. 626. Use of Velan PF and Velan NW in the Production of Durable Oil— and Water—Repellent Finishes on Textiles.

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Mercer Lecture

The Society of Dyers and Colourists are holding the sixteenth "Mercer Lecture," at the Banqueting Hall, Midland Hotel, Manchester on November 8, 1961, at 7.30 p.m. The lecture "Bleaching of Cotton," will be given by Dr. J. L. Bolland.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

Carding Hopper Warning Device

Warning lights which can be seen from anywhere in the room or, by suitable wiring to a panel in the office, makes it an easy matter for those in charge to supervise the operation

MANUFACTURED by Electrical Productions (Leeds) Ltd., Hope Road, Mabgate, Leeds 9, under licence from the patentee, Fox Brothers and Co. Ltd., Wellington, Somerset, a new weighing cycle controller is claimed to have the following advantages:—

(1) It gives the operative warning of an impending mis-weigh *before* it occurs.

(2) It increases the accuracy of weighing by ensuring that it only takes place in the most favourable part of the cycle.

(3) The operative and the carding engineer are given warning of either under-filling or over-filling of the hopper.

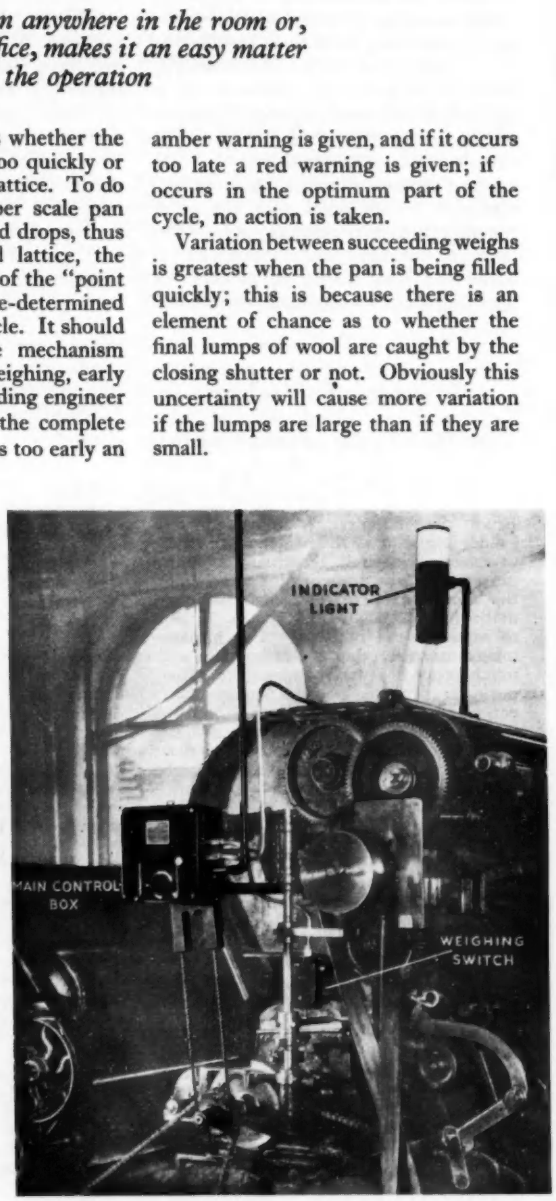
(4) Warning is immediately given if the hopper feed has not been properly adjusted for a new blend.

(5) The fact that the warning lights can be seen from anywhere in the card room, or by suitable wiring to a panel in the office, makes it easy for the carding engineer or anyone else in charge to supervise the hopper minder.

Mis-weighs occur either because some breakdown of the hopper mechanism—in which case warning would be given immediately this occurs or in many cases because the pan is being filled either excessively quickly, so that the weighing mechanism is not fully reset—or most common of all—because the scale pan has not received its full weight before the end of the weighing cycle. This is normally due to the level in the hopper being too low, and this device will give warning *before* the mis-weigh occurs.

In effect, it determines whether the scale pan is being filled too quickly or too slowly by the spiked lattice. To do this, each time the hopper scale pan gets its weight of wool and drops, thus switching off the spiked lattice, the device checks the timing of the "point of weighing" relative to pre-determined limits in the weighing cycle. It should be appreciated that the mechanism indicating the limits of weighing, early and late, is set by the carding engineer to any limits desired in the complete cycle. If the weigh occurs too early an amber warning is given, and if it occurs too late a red warning is given; if occurs in the optimum part of the cycle, no action is taken.

Variation between succeeding weighs is greatest when the pan is being filled quickly; this is because there is an element of chance as to whether the final lumps of wool are caught by the closing shutter or not. Obviously this uncertainty will cause more variation if the lumps are large than if they are small.



This new device is designed to automatically give a visible warning immediately the hopper becomes either under-filled or over-filled, or if the hopper feed has not been correctly adjusted for a new blend.

Unfortunately, there is a tendency for carding engineers to allow a comparatively high rate of feed with its attendant greater variation because they are afraid of mis-weighs when the hopper gets low. However, the makers state that with this controller in action these dangerously high rates of feed are not necessary, because the carding engineer knows that a low warning will be given long before a mis-weigh can occur, and, in any case, if the rate of feed is incorrectly set too fast, a high warning is automatically given.

Hopper level indication is a valuable by-product resulting from this device in that warning is given *before* the level in the hopper reaches the point of where it could affect the accurate weighing of the hopper which, of course, is what is required.

If a carding set is being used to process a variety of blends, it is essential to have due warning if the hopper has not been adjusted correctly as regards the rate of feed of the spiked lattice. It is well known that different blends feed at widely different rates and unless this is compensated for by appropriate adjustment, weighing accuracy is bound to suffer. This device is claimed to give that warning automatically. The fact that a warning is given when the hopper is over-filled, as well as when it is under-filled, means that the hopper feeder has to stay on the job, and if he does not, the carding engineer knows immediately.

Well-known Firm Installs New Lighting

A NEW factory to house a coloured top unit has been opened by Bulmer and Lumb Ltd., worsted spinners, coloured topmakers, top dyers and recombers at Buttershaw, near Bradford. Because of the nature of work at the factory and the importance of colour correction lighting plays a vital role, and A.E.I. Lamp and Lighting Co. Ltd. has supplied in all, over 1,000 fluorescent and tungsten lighting fittings and nearly a mile and a half of invertrunking and shallow trunking. The use of lighting trunking in the new premises ensures a flexible method of mounting lighting and other powered services with ample wiring capacity.

In the coloured tops warehouse, two rows of FX 1160 fittings housing twin 5 ft. 80 watt Mazda "Colour Matching" tubes have been mounted at a height of 18 ft. to provide a level of illumination of 20 lumens/sq. ft. An average of 25 lumens/sq. ft. has been achieved over the area of 24,000 sq. ft. in the drying and gilling department by using FX 1160 fittings housing twin 8 ft. 125 watt Mazda 3,500°K. tubes mounted on eight rows of shallow trunking, 15 ft. apart at 17 ft. 6 in. centres and a height of 14 ft.

Mazda 5 ft. 80 watt colour matching tubes are mounted in FX 1239 diffuser fittings on rows of invertrunking in the Colour Matching Room and at 7 ft. centres along rows 10 ft. 3 in. apart, and a level of illumination of 33 lumens/sq. ft. has been achieved. In the dyehouse, where there is a high humidity atmosphere with corrosive agents present, it has been necessary to install a number of special fully protected anti-corrosive FX 1142 Watershed fluorescent fittings.

The architects and surveyors were Walker and Collinson, 12 The Exchange, Bradford: Mr. D. Pitts, A.M.I.E.E., Bradford, was the electrical consultant and the electrical contractors were Caledonia Engineering Co. Ltd., Downham Street, Bradford.

The colour matching room at Bulmer and Lumb Ltd., Bradford, where Mazda colour matching tubes have been mounted in FX1239/2/8060 diffusers on intertrunking

New Air Heater

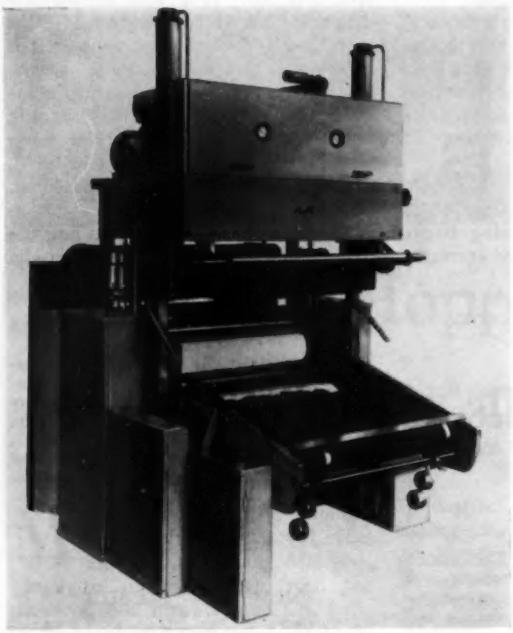
A NEW single circuit air heater which achieves high thermal efficiencies by using the incoming air as a coolant along the hot surfaces of the furnace shell has been produced by Davidson and Co. Ltd., Sirocco Engineering Works, Belfast 5. The S.C.D. air heater has been developed from the company's range of multitubular air heaters and is expected to find many applications in space heating and industrial processing plant.

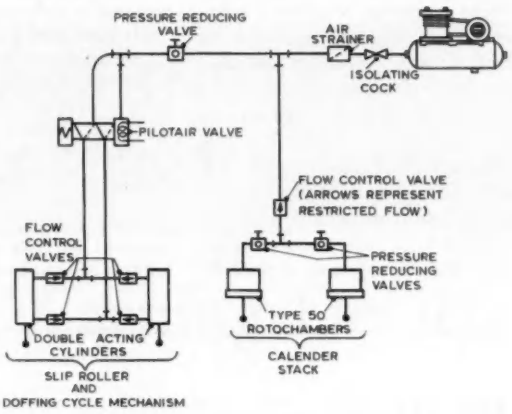
It is adaptable for use with almost any type of fuel and the system of routing the incoming air over the high temperature furnace top and back combustion chamber surfaces tends to prevent any burning out of these members even at the maximum ratings quoted, provided firing is reasonably efficient. The consequent warming of the incoming air before meeting the tube banks ensures that these do not fall below moisture dew point, thus almost eliminating corrosion and prolonging the effective life of the tubes.

The flue gas circuit is from the furnace to the back flue or back combustion chamber, through a "single pass" assembly of banks of oval tubes and thence to the flues via the front smoke-boxes which are furnished with the usual wide doors for easy tube cleaning. These smoke-boxes may be arranged to exhaust the flue gases either to overhead or underground flues. Soot removal doors are also provided at each side of the back flue or back combustion chamber. The S.C.D. air heater is made in three sizes.

Chemical Price Revision

Associated Chemical Companies (Sales) Ltd., have introduced a revised home price schedule for chromium chemicals in which it has been found possible to incorporate a reduction in the price of certain chrome products as a result of increased efficiency from new plants. Customers who have not received full details should write immediately to P.O. Box No. 6, Leeds.





Pneumatics in the Textile Industry

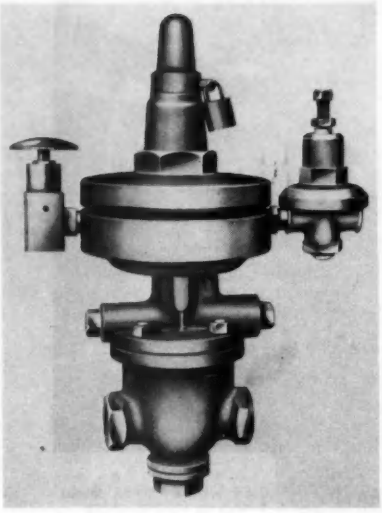
IN recent years the use of pneumatics in all branches of industry has grown steadily and in the textile industry particularly several interesting applications are now found.

One very good example showing distinct gains to mill operators is the pneumatic control of automatic lap doffing scutchers marketed by Platt Bros. (Sales) Ltd., Oldham. The application of pneumatic loading to both calender stack and slip roller (lap roller) has dispensed with the racks, gearing and friction brake normally employed, thus eliminating lap irregularities caused by the stick-slip action of the rack brake, while the increased calendering pressure enables laps of much greater density to be produced. Calendering pressure on the lap sheet is claimed to be over four times that of a conventional machine and it is stated to be possible with some cottons to produce 100 lb. laps within a diameter of 23 in.

The system as applied to machines marketed by Platt Bros. (Sales) Ltd., produced by the Westinghouse Brake and Signal Co. Ltd., Kingswood, Bristol, and is fully automatic in operation. When the lap reaches correct length the Pilotair valve (circuit diagram) is automatically operated by a mechanically tripped switch. The action of the cylinders, which have been applying a constant pressure to the ends of the slip roller during lap formation is now reversed and as the loading heads are lifted the lap is mechanically ejected and a new slip roller collected from the magazine. On reaching the top position the valve solenoid is de-energised and as the loading heads move downwards again the new slip roller is lowered on to the oncoming lap sheet, the fringe of the lap sheet being wrapped over the slip roller by a wiper plate. The operative withdraws the slip roller from the completed lap and replaces it in the magazine. The lap is then removed from the tray and the cycle is complete.

Compressed air is supplied by an integral motorised compressor set, so that each scutcher is a self-contained unit, obviating the necessity for any external air lines or compressor equipment. Adjustment is provided so that the pressure on the calender rollers can be altered to allow for various grades of cotton, enabling a perfect lap to be produced for all types of material. The double-acting cylinders are also provided with an adjustment to compensate for slight variations in internal friction or rates of wear.

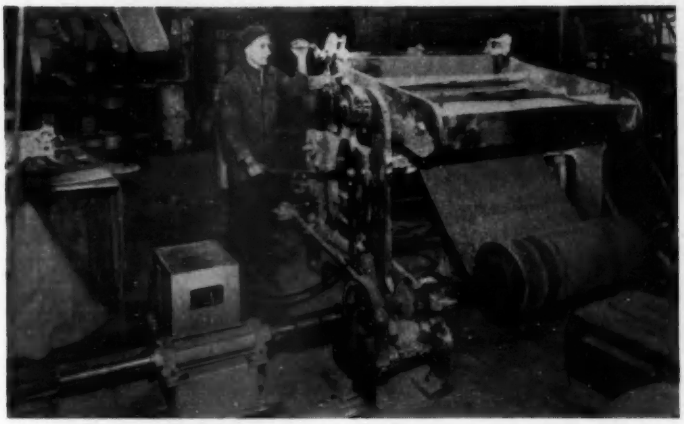
Lowering the Time Taken to Fill Steam Vessel



THE time taken to fill a vessel with steam to a required pressure can now be reduced by as much as 75%, it is claimed, by using a new quick filling attachment introduced by Sir W. H. Bailey and Co. Ltd., Albion Works, Patricroft, Manchester. This time reduction, obviously important, can also mean increased production in various industrial processes, as the time taken for an operating cycle can be considerably reduced.

The new, patented, quick filling attachment, which is designed for incorporation in a Bailey reducing valve, obviates the delay inherent in the use of all conventional reducing valves, by which the *rate* of pressure build-up decreases as the required setting is approached. The attachment allows full steam flow through the valve to be maintained until the pressure is within two p.s.i. of the set pressure. At this stage, a special diaphragm control valve lifts to admit steam to the underside of the diaphragm of the reducing valve, which then operates as usual. The attachment can be supplied as a conversion unit for existing Bailey Class "G3" reducing valves, or already incorporated in new Class "G3" or Class "A" valves.

New Edge/Line Guider

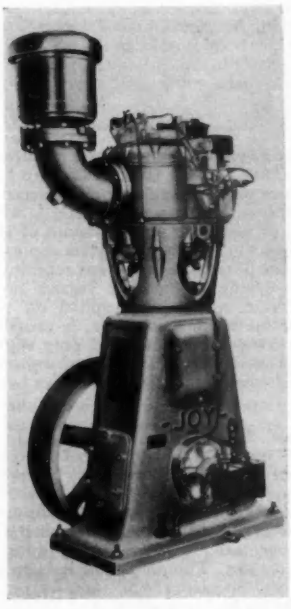


THE new Wadsworth-Lock edge or line guiding equipment announced by A. M. Lock and Co. Ltd., Prudential Buildings, Oldham, Lancs., consists basically of a sensing head and a completely independant, hydraulic ram control unit which is capable of adjusting very quickly in a lateral direction the position of reels weighing from a few pounds up to several tons. Alternatively, webs of moving material can be positioned by using the hydraulic ram unit to operate a roller guider. A number of edge or line sensing units are available including a pneumatic detector and a fully transistorised electronic print line tracking unit which can guide a web at speeds up to 1,500 ft./min. from a continuous or broken line printed on the web.

Automatic Positioning

The pneumatic and electronic sensing heads as well as the hydraulic ram positioners have been carefully designed and engineered to ensure reliable trouble-free operation under arduous industrial conditions. Automatic edge positioning can be used to advantage in many industries, including paper and board converting, steel and aluminium manufacturing, textile finishing, plastics, felt, linoleum, roofing felt, rubber, etc.

Heavy Duty Compressors

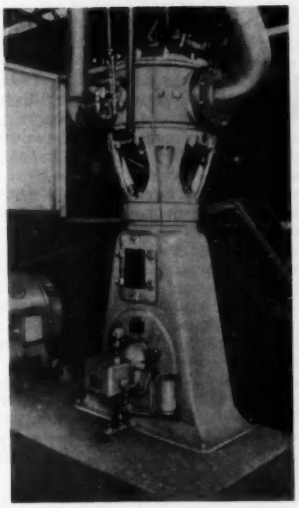


The new WG-9 "Industrial Air" compressor is a vertical-design, single cylinder, single stage, water cooled unit, designed for continuous heavy duty operation

A NEW range of air compressors featuring compact vertical design and rated for 24-hour heavy duty applications is announced by the Air Power Division of Joy-Sullivan Ltd., Cappielow, Greenock, Renfrewshire. The Joy WG-9 Industrial Air Compressor is a single cylinder, single stage, water-cooled unit, designed for service as a main air supply for all small factories and plants or as an auxiliary supply for larger plants. Available in six cylinder/stroke sizes giving free air delivered outputs of 75 to 334 c.f.m. at working pressures of 15 to 150 p.s.i., the largest of these compressors requires a floor space of only 3 ft by 3 ft. 5 in.

The WG-9 embraces the lower capacity range not already covered by Joy WN series heavy duty stationary compressors. As with the WN series, there is a complementary range of WG-9 compressors specially designed to give completely oil-free air. Designated WGO-9, these units are available for conditions where absolute air purity is critical, such as in the chemical etc. industries. All WG-9's are delivered as an integrated pre-aligned "package" unit, requiring only the preparation of a simple concrete foundation block and connection to the necessary air, power and water lines before being put into service.

The standard drive is by Poly V-belt, though multiple V-belt drive can be supplied to order. Direct couplings or gear boxes can be fitted for use with diesel engines. The cast iron cylinder is solidly mounted on a heavy, broad based, C.I. frame. All parts of the compressor which are subject to wear are replaceable, including the cylinder liner which is made of special alloy iron and individually honed to extremely close tolerances. An exclusive truncated aluminium piston permits angled location of valves in the cylinder head, rendering improved heat and air transfer, higher air capacity and extended valve life.

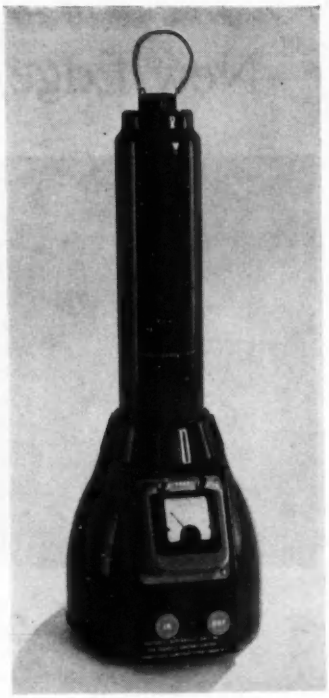


The WG-9 industrial compressor installed at the Hillington Works of Remington Rand Ltd.

Worsted Machinery Order for Poland

Prince-Smith and Stells Ltd., Keighley, a member of the Stone-Platt Industries Group, secured an order for their "New Continental" Worsted textile machinery to the value of £400,000 at the recent Poznan Fair. A delegation from Poland visited England to discuss their future requirements of textile machinery.

Putting Purified Water on Tap



A MAJOR producer of water treatment plant and ion exchange materials, Permutit Co. Ltd., Gunnersbury Avenue, London, W.4., manufacture a whole range of equipment developed to deal with the vast quantities of pure water needed for large industrial users and for the comparatively small quantities needed in laboratories and workshops. The latest unit announced by the company is the Mark 7 portable "Demineralit," consisting of a plastic body accommodating a battery-operated tester and control valves, plus a detachable plastic cartridge containing a bed of intimately mixed "Zeo-Karb" cation and "De-Acidite" anion exchange materials. When water passes down through this column, virtually all ionised solids are removed, resulting in demineralised water of a quality satisfying the B.P. specification for purified water.

After treating its rated capacity, the cartridge is replaced by a regenerated one and further treatment can then continue. The company have a speedy cartridge exchange system to ensure continuity of supply. The complete unit plus a spare cartridge costs £35, and replacement cartridges cost £5 6*s*. 0*d*. for five. When it is realised that on water of London type, the Mark 7 will produce about 16 galls. of purified water per cartridge—and much more on moorland type water common in Northern England—the low cost of operating this unit is at once apparent. Added to this there is the undoubted advantage of the ion exchange process: no scale or sludge, simplicity in operation, constant flow rates and purified water of consistent quality—monitored continuously by the tester.

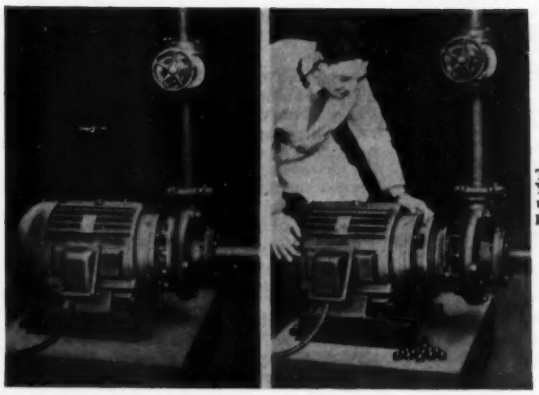
General Service Mopump

MAKERS of the well-known Mopump centrifugal pumps, Rhodes, Brydon and Youatt Ltd., Stockport, announce a range of compact, close-coupled pumps suitable for many applications.

The general service Mopump is of the single entry, single impeller type, and since it is fitted with a mechanical seal the shaft length has been reduced to a minimum. Hence the pump is closely coupled to the motor and the whole unit is extremely robust. The pump is designed to fit the new compact motors to the dimensions of British Standard 2960, parts I and II, in which either drip-proof or totally enclosed motors are interchangeable.

Another useful feature is the simple method of unit construction or close coupling. With this unit construction design, the pump can be opened for inspection or maintenance without the need to disconnect the pipework or lift the motor. Mere removal of the nuts securing the pump casing will permit the motor, complete with the seal housing, to be moved back along the slide-rails on which it is mounted. The impeller and the inside of the pump casing are thus exposed without in any way disturbing the pipes and pipe joints.

The "G.S." Mopump is of all-ferrous construction; casing, seal housing and impeller are in cast iron and the flanges are machined and drilled to BST"D". A capped nut and locking washer secure the impeller to the shaft on to which it is keyed. The shaft is sealed by a spring loaded radial faced, balanced seal. Twenty-nine pump sizes, ranging from 1 in. to 5 in. branch size, provide a comprehensive choice of pump and motor combinations. By fitting motors suitable for 50 cycles supply at both 2 pole and 4 pole speeds, a range of duties is available up to 500 imperial galls./min. and total heads of 180 ft.



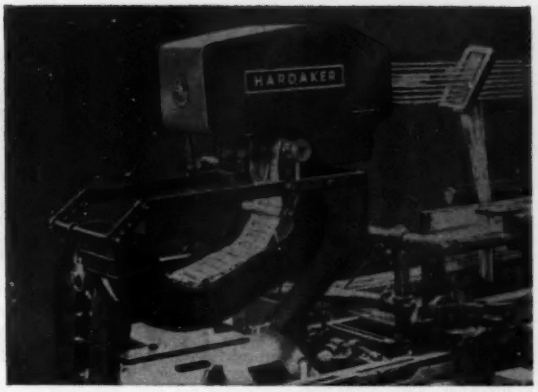
The Rhodes, Brydon and Youatt unit construction illustrated on the new Mopump for general service.

NEW PATTERN CARD. A new publication (C.D.C.98) from Ciba Clayton Ltd., Manchester 11, gives the dyeing procedure for Chlorantine Fast Scarlet 2GLL which produces yellowish scarlet shades of good light and wet fastness properties applied on cellulosic fibres. The company recommend it for dyeing cotton and viscose rayon, linen, jute and sisal. Applied on wool unions the wool, it is stated, is unstained in the range 40 - 60°C. and only slightly stained at 95°C. "Dead" or immature cotton is covered well.

* * *

FOAM CONTROL. A valuable folder issued by I.C.I. Ltd., Nobel Division, Silicones Dept., Stevenson, Ayrshire, Scotland, gives some of the uses and advantages of "Silcolapse 437" in suppressing foaming in dye vats and hank dyeing machines, etc., and in other industrial wet processes. The properties and applications of "Silcolapse 430" are set out in another leaflet. It is effective in defoaming solutions of soap and most wetting agents, in reducing foaming in the manufacture of phenolic resins, and in reducing foaming and "bumping" distillation of many types of materials.

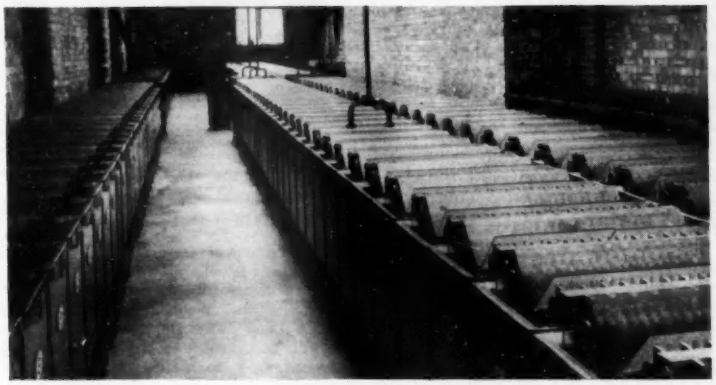
Miniature Jacquard for Weaving Name Selvedges



AN entirely new machine for producing woven name selvedges is announced by John T. Hardaker, Bowling Ironworks, Bradford. It is called the Jacquarette and is in effect a miniature Jacquard, measuring only approximately 17 in. long × 13 in. wide × 13 in. high. This compact size has been made possible by the use of small cards—3⅞ in. × ⅞ in. wide—with a maximum of 48 figuring ends.

The Jacquarette is said to be particularly suitable for modern topless looms but is also adaptable for use on most types. It is mounted at the end of the loom in a position similar to a side dobby. The photograph shows a typical installation of the machine which, the makers point out, has been perfected after prolonged testing and demonstration machines actually in production can be inspected by arrangement.

Jointless Flooring and Surfacer



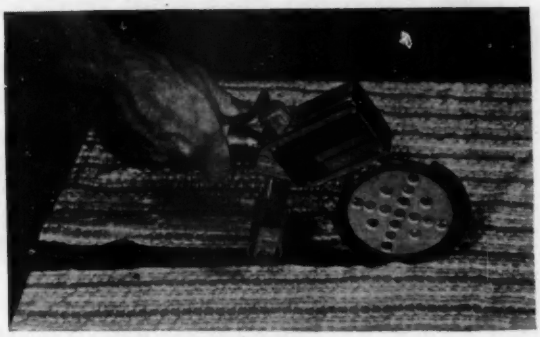
A FLOORING composition which is claimed to incorporate the latest developments in the flooring field, is announced by Prodorite Ltd., Eagle Works, Wednesbury, Staffs. Prodorite-Epiflor is a monolithic material, applied by trowelling or spreading, based on epoxy resins, inert fillers and aggregates. It is applied normally to old and new clean concrete, including granolithic concrete and sand/cement screeds, to latex/cement screeds, to bricks and tiles, asbestos/cement and suitable wood surfaces. Application is normally to an optimum thickness of about ¼ in. and can be made to horizontal, vertical and curved surfaces.

Application is a speedy operation as, under normal temperature conditions, Prodorite-Epiflor can be placed into service within 48 hours. The surface is said to be dustless, non-cracking and of pleasing appearance and it will resist temperatures of up to about 80°C. Whilst occasional spillage or splashing with boiling liquids is not harmful, it should not be subjected to continuous boiling water, steaming or to rapidly alternating conditions of heat and cold. It must have wide application possibilities in the industrial flooring field.

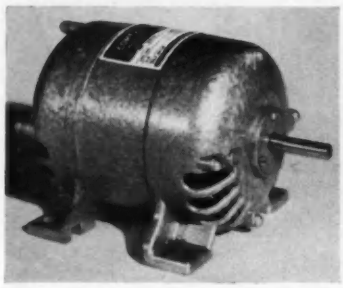
Cutting and Sealing Acetate, Etc., Fabrics

A NEW instrument for cutting and at the same time sealing materials made from acetate, rayon, nylon, acetate/cotton mixtures, etc., is announced by Sjöström Machine Co., Boca Raton, Florida, U.S.A. This seal-cutter is pushed across the material by an operator much the same as a pair of scissors or a rotary knife. A sharp edge of a carboloy-iridium alloy is heated to a suitable temperature to fuse the threads of the material after the cut is made so that there is no ravelling or fraying of the threads.

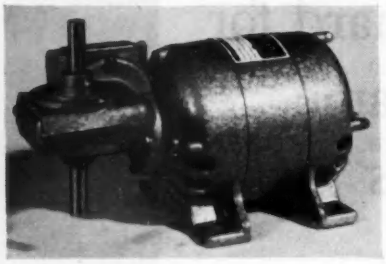
An operator can use the seal-cutter to follow the thread of the material, or the seal-cutter can be pushed along a slot in the table to make a square cut. The average time of cutting across a 40-in. width material is 2½ secs., about the same time required by scissors. The seal-cutter weighs 2½ lb., takes 482 watts at 115 v., a.c., and is equipped with asbestos-covered cord.



In this cutting instrument a sharp edge of carboloy-iridium alloy is heated to a suitable temperature to fuse the cut threads



The Comtex 1/30 h.p. motor unit



The unit with double-reduction gearbox

Fractional Horse-Power Motors

A NEW range of f.h.p. motors of advanced design giving a wide range of torque and output speeds has been introduced by Comtex Ltd., 566 Cable Street, London E.1. Manufactured to Class "E" B.S. 2757 and known as the GL8 (motor only), GL9 (with single reduction gearbox), and GL10 (with double-reduction gearbox), they are available for single and three-phase supplies and various voltages.

All motors, both induction and commutator type, are supplied as standard for reversing and, at no extra cost, a new design of capacitor can be fitted to make compact, self-contained units—or alternatively the capacitor can be separately mounted. They are easily mounted by foot or flange, base holes being elongated for final adjustments. The gearboxes can be turned to bring the output shaft into a variety of positions to suit the job on hand and practically any final output speed can be supplied, it is stated.

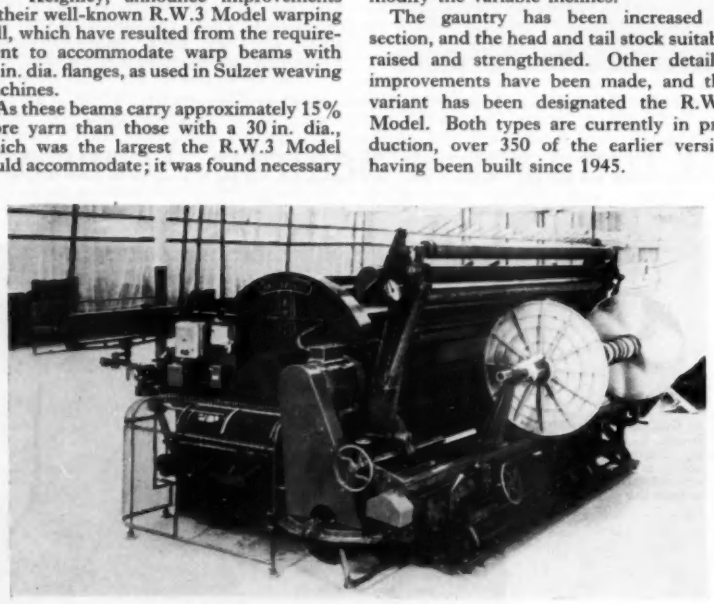
All the shafts are ground to fine limits, and ball journals or plain bearings can be fitted in all frames without dimensional alterations. Unless otherwise specified, all geared units have a ball thrust-journal at the gearbox end. All bearings are prelubricated, giving long, trouble-free life and the grease in the gearboxes has been chosen to give a low-viscosity coefficient. "Encapsulated" windings will be available in addition to the normal Class "E" B.S. 2757, rendering them impervious to attack by moisture, oil, and most chemicals. Thus, an open drip-proof motor "Encapsulated" in this way can often be used in place of a totally enclosed frame.

Improved Section Warping Machine

GEORGE HATTERSLEY AND SONS LTD., North Brook Works, Keighley, announce improvements to their well-known R.W.3 Model warping mill, which have resulted from the requirement to accommodate warp beams with 32 in. dia. flanges, as used in Sulzer weaving machines.

As these beams carry approximately 15% more yarn than those with a 30 in. dia., which was the largest the R.W.3 Model could accommodate; it was found necessary to reduce the circumference of the reel (or swift) from 15 ft. to 12 ft. 6 in., and to modify the variable inclines.

The gauntry has been increased in section, and the head and tail stock suitably raised and strengthened. Other detailed improvements have been made, and this variant has been designated the R.W.4 Model. Both types are currently in production, over 350 of the earlier version having been built since 1945.

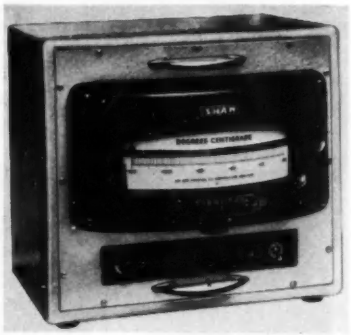


General view of the Hattersley machine

New Hygrometer Alarm

A NEW ultra sensitive indicator alarm for moisture in gas or air is announced by Shaw Moisture Meters, Rawson Road, Westgate, Bradford 1. The dial is scaled — 120°C. to — 20°C. dewpoint or in % relative humidity as desired. The alarm contains a transistorised relay which operates alarm or control contacts according to the setting of the lower red dial pointer, which is adjusted by the thumb screw under the dial.

This new instrument uses small capacitance type sensing elements and it has a wide application in most industries. Typical of these is the measurement of dryness of gases in metal heat treatment processes and in a wide variety of processes in the chemical industry. As the response to humidity changes is immediate, the instrument is suitable for giving warning of wet materials on production lines. It is



used for instance, to warn of wet wool yarn or wet fabric when being oven dried.

The makers point out the instrument works equally well when immersed in liquids containing a slight amount of water. The sensing element can be several hundred yards away from the instrument, only a simple connection to the mains supply is needed, and no maintenance whatever is required, the maximum temperature rating being 180°C.

An improved hygrometer element is also announced by the firm. This consists of a metal plug with ceramic insert which has a 14 mm. thread, and is leakproof up to 2,000 p.s.i. Connection by means of a standard co-axial cable type plug enables several elements to be connected in turn to the company's hygrometer, should readings be required at several points. The protective cover, is of sintered bronze, size 1 cm. dia. by 5 cm. long, which is screwed to the metal plug body.

Poor Crop Estimated in Tanganyika

Barclays Bank D.C.O. states that in the Lake Province insufficient rain has led to a lowering of the crop estimate from 150,000 to 140,000 bales—a poor forecast for a crop which should have totalled 250,000 bales from the seed distributed had weather been favourable. Forward sales have been held by the Lint and Seed Marketing Board and by the end of June, 45,000 bales had been sold at an average price of 206·4 cents./lb.

THE TEXTILE
COLOURIST & FINISHER

Self-Smooth Fabrics: The Use of Formaldehyde

It is now possible to envisage two types of process for the treatment of cotton with acidified formaldehyde solutions at room temperatures: (a) the wet recovery treatment and (b) the dry recovery process

By J. T. MARSH

NO discussion of the application of formaldehyde to cellulosic fabrics would be complete without reference to the original work of Eschalier in 1906.[1] Although his work was directed to strengthening regenerated cellulose, particularly in the wet state, it is not fully appreciated that he employed quite a wide variety of experimental conditions; great attention has been paid to his technique of impregnation with an aqueous solution of formaldehyde, dehydration under acid conditions, and rinsing. One method was to dry at a raised temperature followed by heating to a higher temperature, but Eschalier also suggested treatments in acetic acid solutions over a wide range of concentrations and temperatures, including room temperature. There is no mention of crease-recovery, whether wet or dry, in any of the publications of Eschalier.

Crease-resisting cotton was first produced by Barrett in 1919 but his name does not appear in the long list of those mentioned in the Jubilee Award of the Textile Institute[2]; Barrett's method was to impregnate the cotton fabric in an acidified solution of formaldehyde, dry, and then heat to a temperature of about 150°C. for a few minutes. There are many subsequent processes based on this general procedure but none seems to have been commercially successful, probably because of the embrittlement which accompanies the recovery from creasing. A comprehensive paper on this aspect of crease-resistance appeared in 1959.[3]

The crease-resisting effect produced by the padding and heating technique may be described as dry-recovery, for there is a considerable recovery from creasing in the dry state; there is also a respectable degree of crease-recovery in the wet state although the wet-recovery is somewhat lower than the dry recovery. A similar state of affairs obtains with the products treated by the conventional processes which employ amino-aldehydes. It has been suggested[4] that this type of crease-recovery is due to chemical linkages between the chain molecules of cellulose supplemented by hydrogen bonding; much of the hydrogen bonding is broken by wetting, thus accounting for the difference between dry recovery and wet recovery. (Whether the chemical linkages between the cellulose chains are co-valent cross-linkages or not is still undecided and rather controversial.) The hydrogen bonds can also exert considerable influence on the smooth-drying properties of the treated fabrics, for if the wet and crumpled fabric is allowed to dry in the crumpled state, many of the creases are semi-permanent and capable of neutralising to some extent the crease-recovery effect imparted by the resin bonds.

The extension of the crease-resisting process to the production of the smooth-drying fabric in 1953-54 aroused great interest in the property of wet recovery in itself and there are many chemists, particularly in the U.S.A., who are of the opinion that crease-recovery in the wet state is more important than crease-recovery in the dry state. Whether this is correct or not, this type of thinking was probably responsible for the production of fabrics with wet recovery only and the first of these appeared in the autumn of 1958[5], since when there have been other suggestions.

Fabrics which possess wet recovery without dry recovery were first observed by Wood in 1921; they are very highly swollen when wet. His method was to treat cotton fabric for a few minutes at room temperature in a solution of moderately concentrated sulphuric acid containing para-formaldehyde. (It may be remarked that there is sometimes confusion created by the modern terminology of dry-recovery and wet-recovery; fabrics on the market and described as crease-resisting possess both dry recovery and wet recovery, but fabrics which possess wet recovery only often have less dry recovery than the untreated goods.)

Wet recovery processes all have one feature in common, namely, that they operate on the wet swollen fibre and therefore tend to stabilise it in a distended state which is potentially high-swelling. In the initial stages of the treatment, there is a disruption of those hydrogen bonds which are normally present in the dry fibre and these never reform; consequently, when the treated fibre is placed in water the increased number of free hydroxyl groups attracts more water and a higher internal swelling pressure is

developed. Such a fibre may be likened to a hose-pipe filled with water and in a lively distended state; such views were formulated over 30 years ago[6]. When the distended hose-pipe is subjected to local compression the strained region is distorted but immediately the compression is removed the water restores the original form; the highly swollen fibre is believed to behave in a similar manner, for although the fibre may be deformed by bending or creasing this original configuration is restored by the flow of water under the internal swelling pressure.

From these remarks it will be seen that dry recovery and wet recovery are due to two entirely different causes; consequently there are certain anomalies which should be considered when reviewing the results of one particular recovery test for two quite different products and produced by different means.[7] The wet recovery concomitant with dry recovery in resin-treated goods is quite different, basically, from the wet recovery in swollen cellulose and which is not concomitant with dry recovery.

Treatment of cotton or rayon in the wet swollen state, as opposed to the dry collapsed state, gives a product in which the distribution of the cross-linkages is not the same. When the cellulose is in a swollen condition, many of the hydrogen bonds in the amorphous region are broken and the chains move further apart with the result that any chemical reagent which is intended to bridge the gap between the chain molecules will have to find sites much nearer to the crystallites and where the hydroxyl groups are sufficiently close for reaction to occur; the cross-linking reagents are not telescopic. Hence the reagent acts as a sort of prop between the molecular chains and keeps whole structure in an expanded or distended state; this is in agreement with the fact that monofunctional reagents can also impart wet recovery. When the treated fibre is allowed to dry, the internal props prevent the original hydrogen bonds from forming again, so that the final product may have less recovery from creasing in the dry state than was the case with the untreated fibre. If one regards the conventional crease-resist treatment as an entanglement process, then the wet-recovery treatment is a disentanglement process. These views were first put forward by the writer about two years ago[8] and have since received support from other works in this field of inquiry[9].

Some recent work in the U.S.A. has considerably extended our knowledge of the possibilities of formaldehyde for both wet and dry recovery.

The Wet Recovery Product

During some investigations of cellulose-formaldehyde reactions, an improvement in wet recovery was noticed by Guthrie[10] when fabric which had been moistened with formaldehyde was exposed to formic acid vapour; still

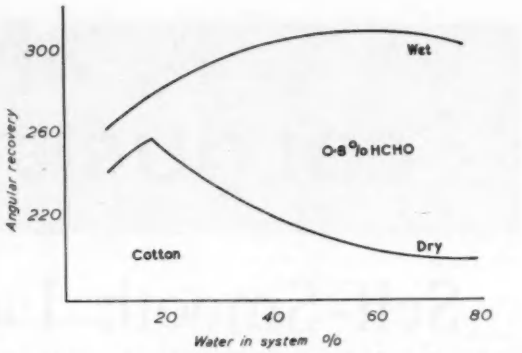


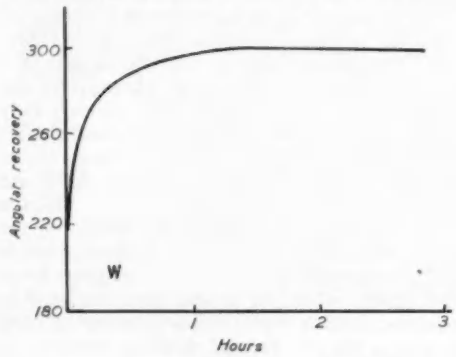
Fig. 2. Effect of the water in the reaction medium on dry and wet recovery

better results were obtained by refluxing cotton fabric in a solution of formaldehyde and formic acid. A more practical treatment was to work the fabric on a jig containing 37% formaldehyde and 5% sulphuric acid for about three hours at room temperatures; about 0·8% of formaldehyde was combined with the cellulose in this manner, and the wet recovery was very good, the dry crease-recovery being substantially unaltered. This process is very similar to that described previously by Morton[11] who stated that no increased crease resistance was obtained, but it is almost certain that he referred to dry crease-recovery and not to wet recovery.

This work was extended by Reeves and his colleagues[12] who established a process in which cotton fabric was treated in a J-box for about 10 min. after impregnating in a solution containing 19·5% of hydrochloric acid and 7·4% of formaldehyde, followed by washing and drying in the usual manner. Mercerised cotton was found to be more suitable than unmercerised material; not only did the reaction proceed at a greater rate, but the ripping strength of the treated mercerised cotton was much better than that of the treated unmercerised cotton.

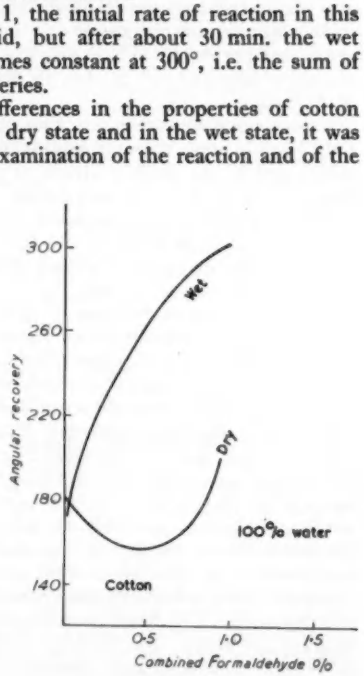
As shown in Fig. 1, the initial rate of reaction in this process is quite rapid, but after about 30 min. the wet crease-recovery becomes constant at 300°, i.e. the sum of warp and weft recoveries.

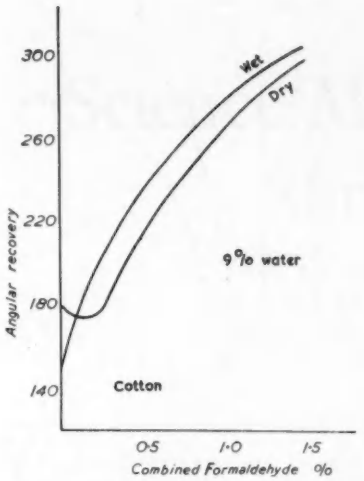
In view of the differences in the properties of cotton fabrics treated in the dry state and in the wet state, it was considered that the examination of the reaction and of the



(left) Fig. 1. Relation between wet recovery and time of treatment in the "wet" process

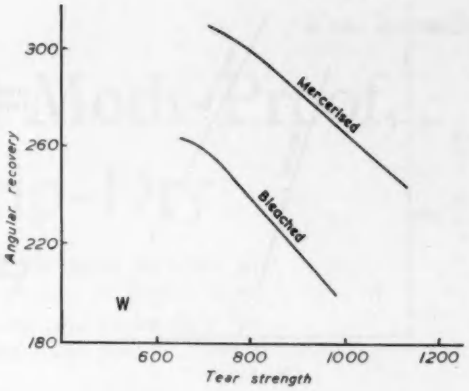
(right) Fig. 3. Relation between recovery and combined formaldehyde in the "wet" process





(left) Fig. 4. Relation between recovery and combined formaldehyde from the treatment in a reaction medium with 9% water (compare Fig. 3)

(right) Fig. 5. Relation between wet recovery and ripping strength produced by the "wet" process



products at intermediate states of swelling might provide some interesting and important information of a fundamental character. It was found possible progressively to replace the water in the aqueous system with a miscible non-swelling liquid and acetic acid was used for this purpose. It was shown[13] that both dry and wet crease-recovery resulted from treatment in the more anhydrous systems but that as the reaction medium became more aqueous, the wet recovery increased and the dry recovery decreased, as seen in Fig. 2, which refers to 0·8% combined formaldehyde.

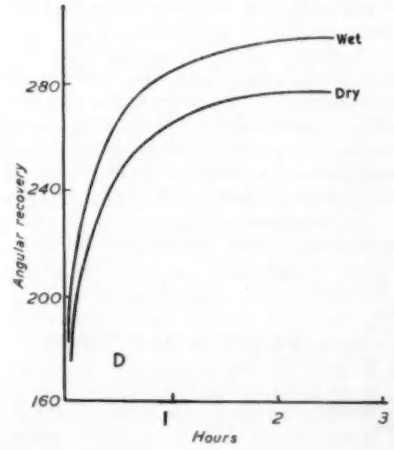
Examination of the completely aqueous system provided results shown in Fig. 3, from which it is seen that aqueous treatment imparts a high wet recovery and a low dry recovery; there is an initial decrease in the dry recovery given by small amounts of combined formaldehyde. As the amount of water is decreased in the reaction medium, there is an increase in the dry recovery, until a high degree of both wet and dry recovery is obtained as shown in Fig. 4. It is interesting to note that wet recovery was good throughout and that its production requires less combined formaldehyde than does dry recovery. A novel feature of these results is the production of dry recovery at room temperatures.

Although the property of crease-recovery is the most important aspect of this work, some of the other properties examined were found to give information of technical and scientific interest. For example, the dry and wet densities were greatest for those samples which had been treated in the system containing the least amount of water; this is in accordance with the hypothesis that the reaction fixes the fibres in a swollen state which is determined at the moment of reaction. Differences in the affinity for direct dyes were observed, and samples from the aqueous system dyed more deeply than the untreated, whereas those from the systems with less and less water finally exhibited resistance to dyeing. This is in accordance with related work by Wood.[14]

Further evidence for fixation in the expanded state is provided by moisture regain; in the case of fabrics containing 0·8% combined formaldehyde as a result of treatment in a medium containing 75% of water, the moisture regain was 9·44%, compared with 7·45% in the sample from the solution containing 9% of water. Water retention after centrifuging the treated samples showed that the non-swelling system gave a product whose water imbibition was 67% of the control compared with 120% for the sample treated in the system containing 68% of water.

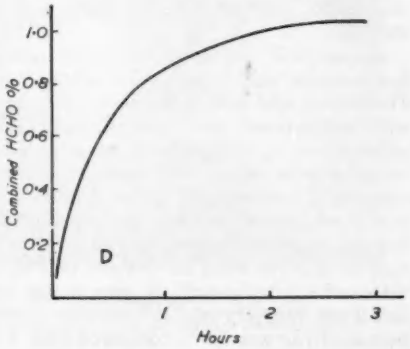
From the above survey it is clear that it is now possible to envisage two types of process for the treatment of cotton with acidified formaldehyde solutions at room temperatures —(*a*) the wet recovery process, and (*b*) the dry recovery process—although the product which possesses dry crease-recovery also has a high measure of wet recovery. The two extreme products have been described in further detail by Reeves, Perkins and Chance.[15]

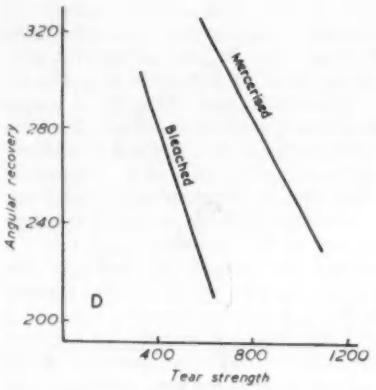
The relationship between the wet recovery and the ripping strength is shown in Fig. 5 from which it appears that for a wet recovery of 260° the ripping strength of the bleached fabric was 700 g. whilst that of the mercerised cloth was 1,050 g. The advantages of treating mercerised cotton are quite clear. Fabrics with the high wet recovery



(left) Fig. 6. Relation between recovery and time of reaction in the "dry" process

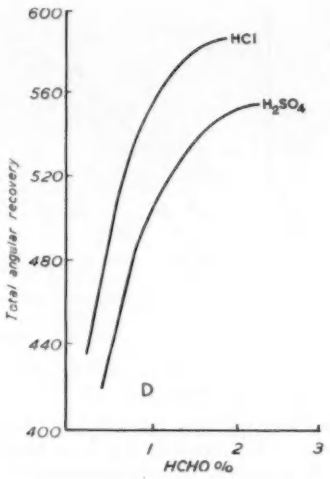
(right) Fig. 7. Relation between time of treatment and combined formaldehyde in the "dry" process





(left) Fig. 8. Relation between wet recovery and ripping strength from the dry process

(right) Fig. 9. Comparison of hydrochloric and sulphuric acids in the "dry" process



give a wash-wear rating of 4 to 5 after machine washing and line drying; the effect is resistant to repeated launderings.

The Dry Recovery Product

The novelty of producing fabrics with both dry and wet recovery by a process which operates at room temperatures has many attractive features; the following solution was selected after a series of trials in which the concentration of water was varied from 0 to 75%, namely 3·6% formaldehyde, 3% hydrochloric acid, 17% water, and the remainder acetic acid.

The reaction time plotted against wet recovery and dry recovery is shown in Fig. 6 which resembles Fig. 1 except it takes about 1 hour for the curves to level, compared with 30 min. for Fig. 1, but it should be noted that in the wet recovery process, to which Fig. 1 relates, the concentrations of hydrochloric acid and formaldehyde were much higher. The percentages of combined formaldehyde as a function of the time of treatment in the dry recovery process is shown in Fig. 7. It is quite similar to that obtained for crease-recovery, as might be expected.

Particular interest is associated with the relation between the wet recovery and the ripping strength of the treated product; there is the usual loss in strength. Fig. 8 again shows the benefits to be derived from the use of mercerised cotton as opposed to the unmercerised material. With unmercerised cotton, the losses in tensile strength and ripping strength were about 50%, whereas mercerised cotton retained from 65 to 67% of the tensile and ripping strength of the mercerised control sample. The application of a silicone softener raised the value of the mercerised treated sample to 87% of that of the mercerised untreated material.

Repeated launderings showed no diminution in the property of wet recovery, in fact there was quite an appreciable increase (from 260 to 290°); laundry shrinkage was quite insignificant and there was no retention of chlorine.

Reeves and his colleagues tried catalysts other than hydrochloric acid in solutions containing 17% of water. Phosphoric acid was ineffective under the conditions used with hydrochloric acid at room temperatures; with 3·7% sulphuric acid, it required 2 hours to establish the same formaldehyde content and crease-recovery as was reached with 2·9% hydrochloric acid in 1 hour, and moreover, the rate at which wet recovery was obtained was greater than the rate at which dry recovery was produced. However, the time of reaction could be reduced to 1 hour by employing 9·4% of sulphuric acid to give a wet recovery of 270° and a dry recovery of 275° but the amount of combined formaldehyde was 1·9% compared with 1·0 to 1·2% for a similar degree of crease recovery with 3% of hydrochloric acid. Fig. 9 shows a comparison of hydrochloric and sulphuric acids as catalysts; the amount of combined formaldehyde in the treated product is plotted against total recovery, i.e. wet and dry, warp and weft. The advantage of hydrochloric acid catalysis is clear.

It may perhaps be interesting to recall that with the wet recovery process, a solution containing 70% of water gives very good wet recovery and little or no dry recovery in a product with only 0·5 to 0·6% combined formaldehyde, whereas an equivalent wet recovery, accompanied by good dry recovery, from the dry recovery process with 17% of water requires a formaldehyde content of 0·8 to 1·0% in the treated sample; consequently, the strength is lower.

General

A re-examination of the inherent possibilities of formaldehyde has revealed two features of technical consequence. The first of these is the production of wet-recovery cottons; it is not known with certainty how many finishers are operating formaldehyde processes of this type, but it is believed that commercial treatment is practised, in conjunction with additives such as polyethylene emulsions to offset the reduction in ripping strength.

The second item of technical importance is the successful addition of a high measure of dry recovery to the wet recovery produced at room temperatures; this is caused by operating under conditions of controlled and moderate swelling. It is very probable that the distribution of linkages between the chain molecules of cellulose in the "wet with dry" recovery product is different from that in the "dry with wet" recovery product from the well-known treatment with amino-aldehydes. Fundamentally, the two types of treatment with formaldehyde at room temperatures are batch processes, but there appears to be good reason for assuming that continuous processing could be employed with a suitable "delay" as in the J-box and similar devices.

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Science Makes Wool Moth-Proof, Shrinkless, Drip-Dry

Under the spur of competition leaders of the wool industry in Australia have realised that it is not sufficient to export high quality wool. They are also exporting ideas and technology for the production of improved wool yarns and fabrics

By J. LOUGHLIN

IN a highly competitive business struggle it would appear to be sheer madness to give away your best money-spinning ideas and to reveal the secrets of your most successful processes. But that is exactly what Australia, the world's leading wool producing country, is doing. Not only is she offering freely some of the most important discoveries to come from wool textile research, but is actively encouraging manufacturers throughout the world to exploit the processes.

The most recent discoveries made in the wool textile research laboratories of Australia's Commonwealth Scientific and Industrial Research Organisation are the Si-Ro-Set process for putting permanent creases in trousers and pleats in skirts, and the Sironizing process for producing wash-and-wear non-iron woollen garments—a research triumph welcomed by the wool industry as one of the most important advances since cloth was first woven from wool.

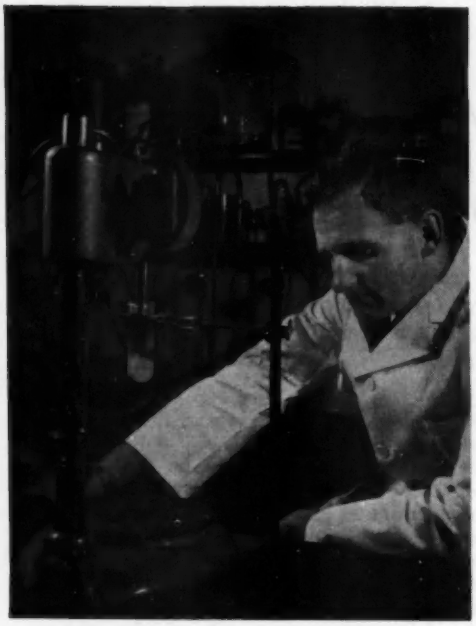
Australia, whose 155,000,000 sheep provide 30% of the world's wool and 70% of all fine merino wool, whose export income is half made up by the wool cheque, is vitally concerned to promote the use of more and more wool. So, when the Si-Ro-Set permanent creasing process was ready less than three years ago, it was immediately made available to industry already it has been adopted by at least 20 countries, but its use is most widespread in Australia, where the value of following up successful research with an educational programme to encourage its application by industry has proved its worth. About 200 local manufacturers have taken up this process and so far they have used it in the production of 2,000,000 pairs of trousers and pleated skirts.

The later Sironising process to give wool the popular wash and non-iron attributes has only recently gone into commercial production in Australia. Its use, also, is to be encouraged throughout the world. Its most important application will be in the making of shirts, sports trousers, blouses, dresses, and particularly school tunics.

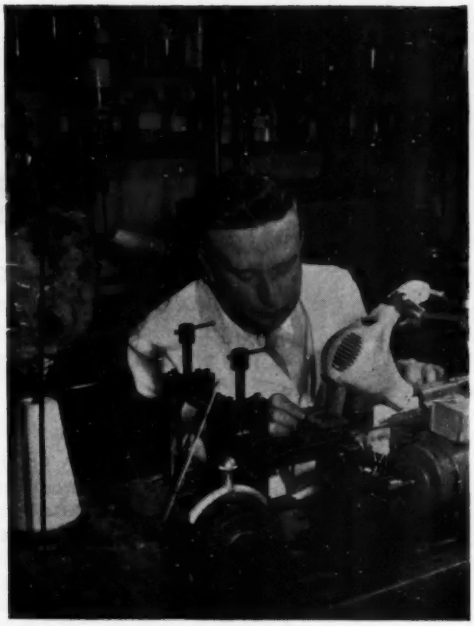
Over the past 10 years or so, the growing family of synthetic fibres—light, varied, mothproof, and easy to launder—has loomed as a real threat to Australia's greatest single source of income. As their popularity has grown, they have made disturbing inroads into wool's traditional fields. The lesson has been clear to all but the most complacent. Wool would continue to lose ground unless practicable solutions could be found to the well known disadvantages inherent in the structure of the wool fibre. These were, principally, its attraction for moths, and its tendency to shrink and felt when washed.

Towards the end of 1949 three laboratories were set up by the C.S.I.R.O. They are known today as the C.S.I.R.O. Wool Research Laboratories. The Division of Textile Physics at Ryde, New South Wales, is engaged on physical research on wool and textile processes. The Division of Protein Chemistry at Parkville, Melbourne, concentrates on the structure and chemistry of wool and the application of this research in wool technology. Popular interest has focused on the third laboratory—the Division of Textile Industry at

Three scientists at the Division of Textile Industry at Geelong, Victoria, credited with some of the most outstanding triumphs in wool research, examine Sironized (wash and wear treated) garments. Dr. J. R. McPhee, Dr. M. Lipson, Chief of the Division, and Dr. A. J. Farnworth



(left). Dr. J. H. Bradbury, tunes a generator producing ultrasonic waves to break down wool into its several different components



(right). Sizing of yarns is studied as an aid to weaving fine wool cloth. Dr. V. A. Williams uses a device to lay yarn surface fibres after the application of sizing material

Geelong, Victoria. Although some of the best known advances in wool technology have come from here, the textile scientists will stress that at least 70% of the scientific effort within the group goes into fundamental research on the properties of the wool fibre. Admittedly much of this work forms the basis of the practical achievements of the Division of Textile Industry.

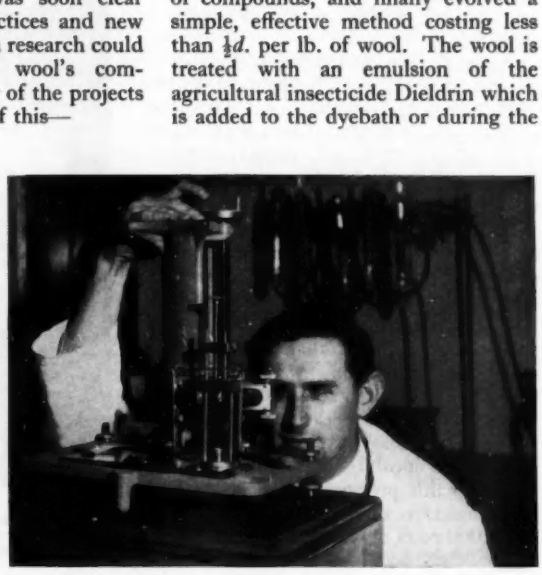
Funds for the work of the Laboratories come partly from woolgrowers who pay a 2*s*. research levy for each bale of wool produced, and partly from the Federal Government, which contributes 4*s*. a bale. This adds up to about £A1,700,000 a year, which is estimated to be a mere one-tenth of what the world synthetics industry is spending on research. A small enough investment in scientific research, which already has yielded results likely to be worth many millions.

The textile scientists at Geelong responsible for the outstanding successes in this field will insist on sharing the credit down the line among their dedicated scientific teams. But three men have been outstanding in a series of brilliant investigations. Two of them, Dr. M. Lipson, Chief of the Division of Textile Industry, and Dr. A. J. Farnworth, took their doctorates at Leeds University after graduating in science at Sydney and Melbourne Universities respectively. Dr. J. R. McPhee, third of the trio, and also a graduate of Melbourne University, took his doctorate at Oxford University.

Australia had few scientists with experience in wool textile research when it was decided to set up the group of laboratories within the C.S.I.R.O. Promising young science graduates had to be sent to Leeds and other universities on student fellowships for training to form the nucleus of the new body. Despite the limited background of experience available at this time, it was not long before useful results began to flow out to industry from the newly established laboratories, and it was soon clear that the improved practices and new products resulting from research could improve substantially wool's competitive strength. Four of the projects are striking examples of this—

Mothproofing

Moths are the wool man's best customer, it used to be said; but no longer. The susceptibility of wool to attack by moths was a serious disadvantage. A large number of chemical protectants has been available in Europe for a quarter of a century but they had not been widely used, partly because they were not cheap enough. The Australian research programme aimed at a mothproofing treatment costing less than 1*d*. per lb. of wool. Dr. Lipson and Dr. McPhee investigated the use of a wide range of compounds, and finally evolved a simple, effective method costing less than ½*d*. per lb. of wool. The wool is treated with an emulsion of the agricultural insecticide Dieldrin which is added to the dyebath or during the



Investigation of the effect of setting agents on single wool fibres — basic research that led to permanent pleating and creasing

Dr. A. J. Farnworth shown in woollen shrink proofed wash-and-wear shirt which has been washed and worn 200 times — and never ironed

last wet processing operation. The process is now being used in most Australian mills, and has extended to a number of other countries, including the U.S., the U.K., and Japan.

Shrinkproofing

Shrinkage, due to the tendency of wool to felt in washing, has always been one of the bugbears of woollen fabrics and a great deal of scientific effort has gone into the search for a satisfactory shrinkproofing process. Felting is caused by the meshing of individual fibres which are covered by sharp-edged scales. The approach to shrinkproofing is to modify the scale surfaces, but earlier methods of treatment generally weakened the material or impaired its "handle" qualities. The effective "G8" process which emerged from C.S.I.R.O. research work at Geelong is cheap and easy to apply and preserves the appearance, strength and handle of the fabric. The wool is treated with potassium permanganate in concentrated salt solution, followed by clearing with sodium bisulphite to remove manganese dioxide formed on the wool. The permanganate treatment is finished when the pink colour disappears from the solution. The clearing treatment ends when the fabric regains its normal colour. This process has the virtue of providing a simple safeguard against over-treatment and enables the fibre surface to be modified without affecting the other properties of the wool. A number of Australian mills are using the method on a large scale.

Si-Ro-Set

Permanent creasing and pleating of wool fabrics by the Si-Ro-Set

All over the world men are wearing trousers permanently creased by the Si-Ro-Set process. This pair has been washed. The left leg had been Si-Ro-Set, the right had not.

process was one of the most notable achievements of the laboratories at Geelong. Methods of permanently setting wool had been known for many years, but for one reason or another they were not adopted by manufacturers. For example trousers manufacturers demanded a process taking no longer than 30 secs. in the factory. Dr. Farnworth carried out a series of experiments with wool fibres and found that stretched fibres, treated briefly with boiling solutions of ammonium thioglycollate would remain almost at their stretched length when released in boiling water.

The quick action of the combination of chemical, heat and water suggested that this would form the basis of a pleat setting method. Tests were carried out with woven fabrics and then with made-up garments. Trousers were sprayed with a weak solution of ammonium thioglycollate and immediately steam pressed in a Hoffmann-type press. This produced a durable crease within the time limit set by the manufacturers and met all other requirements of the industry. To prove the method, members of the C.S.I.R.O. staff made exhaustive wearing tests. They continually wore treated garments under varied conditions. They wore trousers which had one leg treated and the other not. Their children wore treated uniforms at school every day. A processed garment was thrown into water of 120°F. and moved around in it for an hour. In these exacting tests the garments retained their creases and pleats and the Si-Ro-Set process was ready to be applied by garment manufacturers.

Pleats that stay put in a woollen school uniform that can be washed

Sironized

In the eyes of the wool industry the success of the C.S.I.R.O. workers in adding wash non-iron qualities to wool was a real break-through. But this discovery stemmed from the two earlier techniques of shrinkproofing and permanent creasing.

During the Si-Ro-Set experiments, the research workers observed that in addition to setting creases, the treatment preserved the surface of the fabric when it was wet, and this suggested to them that they could achieve non-iron effects by treating the fabric after it had been shrinkproofed. Sixty yards of woollen fabric was shrink-proofed for testing and was then "flat-set" in an operation which permanently set the fabric so that it dried out to its original smooth surface condition. This was done by tightly winding the material on a roller and passing steam through it after it had been impregnated with a weak solution of sodium bisulphite Then shirts were made from the fabric and distributed to C.S.I.R.O. men for wearing tests. One shirt was machine washed and another hand-washed 100 times and drip-dried each time. They are said to have looked better than most drip-dry shirts after these tests. Shirts were tested successfully in the tropics and the Antarctic. The Sironize process, as it was called, was ready for commercial application and was handed over to private manufacturers. Overseas it is to be made available to industry through the International Wool Secretariat.

Photographs by Mr. N. Murray and C.S.I.R.O.

Recent Developments in Printing*

An automatic screen-printing machine and a flash-ager is a formidable combination. It enables high quality vat prints to be produced with relatively little capital outlay

By F. V. DAVIS†

ONE of the most important developments during the past few years in the dyestuffs field was the introduction of the fibre-reactive dyes. These dyes—Procions, Cibacrons, Remazols, Drimarenes and Reactones, have given the printer a remarkable range of bright shades on cellulose with generally good fastness; a brightness which in the past was associated only with fugitive colours. Prints with reactive dyes often have an almost luminescent quality which distinguishes them from the brightest vats. Where required dull shades are obtainable by using mixtures; The reverse process is not, however, possible. The target of research in the case of the I.C.I. Procions has been stated to be one half increased fastness and one-half easier application.

The reactive dyes are easily fixed and a choice of fixation methods is available. Duration of steaming is not critical except in one or two cases. There is no air-free requirement in agers or steamers as there is for vats, dry-heat development in a resin-finish baker is available as an alternative to steaming and reasonable results are obtainable even by printing and tin-drying. Further good points are that the printer sees the colours on the machine in virtually their final shade, so that the balance of colouring is obvious at this stage—a vary real advantage, and reactive prints are free from the defective rubbing fastness shown by many azoic prints.

On the reverse side of the picture the biggest trouble printers have met has been staining of white grounds during wash-off, or bleeding, marking-off and staining on washing made-up garments. Initially it was said that the unfixed, hydrolysed dye had no affinity for cellulose, but it soon became apparant that this was an over-simplification and in practice some dyes became known as "stainers". As the ranges of dyes from the various makers have increased, particular attention has been paid to this point and it is now generally possible to replace a known "stainer" by a dye of similar shade which causes little or no trouble. The worst shade of all was turquoise, but the newer products are a distinct advance on earlier ones.

Certain of the reactives are dischargeable. Others can be more satisfactorily resisted. By judicious selection a range of discharge/resist effects can be obtained where the grounds have better wet fastness than comparable discharges on direct grounds, plus in many cases the additional brightness of ground shade. The latest in this direction is the Procion-Resin resist style, where a print of Procion dye, resin and catalyst forms a resist to a normal padding with Procion dye and alkali.

From the start, reactive dyes were attractive as resists under Aniline Black and this style has been very successful. Similarly, certain reactive dyes can be effectively used as resists under Variamine Blue grounds and some other azoic grounds such as Brown V and Blue Green Salt G (Hoechst). Altogether, they are a versatile group, capturing a proportion of the printing formerly done with vats and azoics. This tendency will undoubtedly increase although for the highest all-round fastness, e.g., in furnishings, they are unlikely to replace vats. They are far less likely to gain wide usage among the big pigment printers, who are set up for a print-dry-bake process and who would be reluctant to undertake the thorough washing-off so essential for satisfactory reactive prints.

Flash Ageing

Before the war we had the "Colloresin" process of vat printing, where the actual print paste contained only vat dye and an alkali-coagulated thickener. The dried print could be stored and padded at leisure with an alkaline suphoxylate liquor and passes immediately into a steamer or ager. The flash-ageing technique is an extension of this, where the padding liquor is caustic soda and hydrosulphite There must only be a gap of a few inches between the nip of the padding mangle and the mouth of the ager, but the ageing time necessary is then only of the order of 20 secs., so that a relatively small and simple ager is adequate.

The process enables not only normal printing vat dyes to be utilised, but also some which do not print satisfactorily by the usual "all-in" method. It gives full, bright effects because the dye is largely confined to the fabric surface and over-reduction is less likely. In Germany every large printing firm now has a flash-ager and another advantage claimed is that chemical oxidation is unnecessary; a rope-washing with water only removes thickener and enables oxidation to proceed.

In the U.K. the larger printers have been in no hurry to adopt flash-ageing and the most interested seem to have been the relatively small and new firms, particularly screen printers. The combination of an automatic screen-printing machine and flash-ager is a formidable one from the roller printers' point of view. In other cases the brightness and high yield of reactive prints has made printers think along the lines of flash-aged machine-printed vat dyes as giving an article competing in brightness and richness.

Flash-ageing has resulted in fresh thoughts about reducing agents. Caustic soda-hydrosulphite liquors are powerful reducing agents for vat dyes, but their stability at room temperature is poor, particularly in the form of a thin film on cloth and this necessitated the very small air-gap between mangle and ager mouth. To facilitate matters, B.A.S.F. introduced Rongal A, a modified sulphoxylate which is stable along with caustic alkali in the cold but quickly develops high reducing power at ageing temperature. Used instead of

* *A recent paper to Rossendale Textile Society*

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hydrosulphite for flash-ageing it avoids some of the troubles associated with hydrosulphite—premature reduction in the cold, bleeding and poor definition—and it enables the short air-gap to be increased while still requiring ageing times of the order of 20 secs.

Initially, air passages of up to 30 secs. between mangle and ager mouth were suggested, but practice seems to suggest that this is too long and that 5 - 10 secs. is a better figure. The disadvantage of the product is its batch-to-batch variation in effective strength and in physical form; varying from a viscous liquid to a paste which sometimes contains hard solid particles. Despite this, it seems to find widespread use in Germany and a number of printers in the U.K. have tried it.

Reducing Agents

The newest reducing agent, Rongalite FD, is again from B.A.S.F. Whereas Rongal A is an alternative to hydrosulphite for flash-ageing Rongalite FD is an alternative to the printer's normal formaldehyde-sulphoxylate. It is more stable at low temperatures and only begins to reduce at over 70°C. It is particularly interesting to screen printers who have to guard against "wasting" of sulphoxylate when vat prints are dried on the tables. Rongalite FD requires a longer steaming time than normal sulphoxylate. Another use is to substitute half the normal sulphoxylate by Rongalite FD for those vat blues which are easily over-reduced—Blue GCP, Blue 3G, etc., to obtain increased yield and brightness of shade.

Azoic Printing

It is well known that this range has been lacking in greens also relatively dull tertiary shades and considerable attention has been paid to this during the last few years. First there was Fast Blue Green Salt B (Hoechst) which gives rather dull blue-greens on a range of Naphtol or Brenthol preparers. Then Fast Olive BR Salt (Hoechst) which gives very dull dischargeable shades of the camouflage and "jungle green" type. Next there was Naphtol AS-KN (Hoechst) of limited solubility and rather difficult to work with, which gives dischargeable olive to khaki shades, also the later Naphtol AS-KG, giving dischargeable dull golds and browns.

An entirely new break is Naphtol AS-FGGR (Bayer), where phthalocyanine is chemically linked to a yellow-producing component, so that good greens are produced with a range of the normal fast colour salts. The shades are vivid and rich, and can be utilised for dischargeable grounds. This again is a difficult product to work with, having virtually no substantivity, and migrating badly during drying unless strict precautions are observed. The final development in this field at the moment is the Variogen Bases (Hoechst). Here again is a new principle—diaotisable bases or their fast colour salts—that couple with the standard dyers' or printers' Naphtols or Brenthols to give red shades, but which on after-treatment with certain metal salts form co-ordination compounds of different colour, with high fastness. Variogen I gives rich greens with cobalt compounds and blue-greys with copper compounds. The unmetallised dyeing is readily dischargeable to white or with vat colours, so that a range of discharge effects on rich green and blue/grey grounds, with much better fastness than the diagotised and developed greens and direct greys, is now available. Variogen II gives productive dischargeable browns. Though here some printers have previously used Fast Brown V Base or Salt with success.

Printing Techniques

Continental screen printers had a good run with the acrylic fibre Dralon, using a lightweight spun fabric of woolly handle, printed in a characteristic style of heavy multiple fall-ons to form a generally dark rich ground for isolated brilliant and even flourescent objects. This "Dralon Imprimeè" style—instantly recognisable—was very popular. In this country, the printing of "Courtelle" got off to a later start but a similar type of fabric is being printed here now, using (as in Germany) mainly the specialised basic dyes developed for acrylic fibres, while the B.A.S.F. auxiliary Glycein PFD has been very useful in obtaining full fixation without resorting to pressure steaming. The fastness standards set by Courtauld's have been higher than those set in Germany and the customers' desires for very bright and rich shades have created difficulties for the printer, who found it difficult to satisfy both parties in certain shades.

Printing "Terylene" and Blends

The most attractive technique for printing "Terylene" is the so called "Thermosol" process where dried prints are heated under virtually heat-setting conditions at about 200°C. so causing rapid diffusion of dye into the polyester fibre. The requirements are suitable apparatus—a setting stenter with uniform temperature in the desired range, or some alternative apparatus—and correct choice of dyes. The obvious choice is, of course, the disperse dyes, but here one is limited by the volatility of these dyes at the high temperature used. Dyes which volatilise easily give a sort of "flushing" of colour round objects and even a marked general staining of white grounds. A few years ago, The Hoechst Company, for their polyester fibre "Trevira" adopted the policy of collecting together the best dyes for the job, whatever their country of origin, marketing them as "Samarone" dyes. Printers in this country had to do their own testing on samples drawn from the world manufacture and select the best themselves but I.C.I. Fibres Division will now give specific recommendations for the best dyes, again irrespective of origin.

An alternative was vat dyes, but only a few of the normal vat dyes can be printed as unreduced pigments and fixed on "Terylene" by the Thermosol method. Cassella then introduced the Polyestrene range—selected vat dyes from various sources, some probably made specially for the job, containing a carrier or accelerator in the paste. These enable a range of shades with very high all round fastness to be obtained by the thermosol method, but there are limitations on depth of shade, particularly on filament cloths.

The latest addition is the Francolor Esterophiles, a short range of special dyes of the disperse type, having both small molecular size, so that they can diffuse into the fibre relatively easily and very little tendency to volatilise at high temperature.

On printing "Terylene/cotton unions there are two possibilities. First, is the printing of vat dyes and fixation by both thermosol and normal ageing to obtain fixation on both fibres. This demands selection of dyes and probably the best exploitation would be to use the Polyestrenes by a Colloresin or flash-age method, Thermosol-fixing the dye on the "Terylene" and then padding with alkali and reducing agent, and ageing to obtain fixation on the cotton. The second is to print a mixture of suitable disperse and reactive dyes and develop

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Factors Affecting the Efficiency of Washing Processes

IN a recent paper to the Manchester Branch of the S.D.C. Mr. G. J. Parish, B.Sc., A.Inst.P., said: the continuous removal of impurities from textile materials by treatment with water was a process commonly carried out on a range consisting of a series of tanks each containing water in which the material was immersed and each followed by a nip through which the material passed before entering the next tank. The range thus comprised a number of washing units (tank and nip) in sequence.

Previous analyses of the performance of this type of plant, or of essentially similar plant in other industries, had usually been based on the assumption that the material was brought into equilibrium with the wash liquor in each unit. Under these circumstances the washing performance of any given range was determined solely by the liquor flow ratio, which was the ratio of the through-flow of wash liquor to the carry-over of liquor with the textile from one unit to the next. The washing performance was given by the ratio of the impurity concentrations on the textile material before and after washing; if there was no preferential retention of impurity by the material then, for example, the performance of a single washing unit was given by

$$\frac{C_1}{C_0} = \frac{1}{1+F} \quad .. \quad .. \quad (1)$$

where C_0 was the impurity concentration before washing, C_1 the impurity concentration after washing, and F the liquor flow ratio.

Corresponding expressions were obtained for washing ranges containing different arrangements of units, the form of expression depending, naturally, on the number of units and on the water feed conditions; whether the water was fed to each unit independently or a counterflow system was used.

Equation (1) and corresponding equations applied only if the textile material was brought into equilibrium with the wash liquor. This state clearly represented the limit of performance of this type of washing plant and would not generally be attained in practice. In general, the impurity concentration on the washed material would be somewhat higher than the equilibrium value and the concentration in the wash liquor correspondingly lower.

An investigation of the removal of water-soluble impurities from cotton fabrics in an experimental washing unit had shown that these impurity concentrations could be combined in such a way as to provide a factor, the washing parameter, which was independent of the liquor flow ratio and in effect measured the efficiency of washing in relation to the limiting performance discussed earlier. The washing parameter might range from unity, for a completely inefficient washing unit which produced no reduction in the impurity concentration on the fabric, to zero, for a perfectly efficient unit which brought the fabric into equilibrium with the wash liquor.

Equations governing the performance of different arrangements of washing units could be derived for units with a washing parameter K in the same way that the expressions for the limiting cases were obtained. For example, with no preferential retention of impurity by the fabric, the performance of a single washing unit was given by

$$\frac{C_1}{C_0} = \frac{1-K+KF}{1-K+F} \quad .. \quad .. \quad (2)$$

This equation might be compared with equation (1) to which it reduced when $K = O$. Corresponding general equations applied for different arrangements of units. In each case the washing performance was limited both by the liquor flow ration F, and by the washing parameter K. This double limitation had important consequences. For instance, a large liquor flow ratio was not warranted if the washing parameter was large (i.e., if the unit was relatively inefficient) and a very small value of washing parameter was not necessary if only a small liquor flow ratio was to be used.

In conclusion Mr. Parish said the washing parameter was not a function of the layout of the washing machine alone, being dependent also on such factors as the type of fabric, the type of impurity, and the fabric speed. It was therefore characteristic of the whole washing arrangement and was constant only when all the variables were constant. The effect of changes in these variables might be measured by the change they produced in the washing parameter, which thus provided the scale of performance essential to a quantitative analysis of the many factors which influenced the washing process.

Recent Developments in Printing

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both simultaneously by the Thermosol method. Although a bit tricky, this method is undoubtedly attractive.

The Star Process

This is one of the few successful attempts to produce something different to that done by normal roller printing or screen printing. Here, suitable dyes which may be vat, direct, reactive, etc., are printed along with special resin compounds on to smooth paper by paper-printing machinery, usually with three primary colours and black, or the three primaries and a blotch colour. This enables photogravure methods on plate printing machines to be used, with its great range of half-tones and graduations. By passing these papers face down against fabric through a calender working at optimum speed, temperature and pressure, most of the coloured "ink" is transferred to the cloth and the dye may then be fixed by the appropriate chemical treatment, ageing, etc. Naturally, the method is expensive as the paper is only useable once, but with suitable designs the effects produced cannot be imitated by traditional fabric-printing methods.

Japan Wants More Wool

Japan expects to import 1·6 million bales of wool, chiefly from Australia, in the financial year from April, 1961 to March, 1962, according to a Japan Wool Spinners' Association statement. This would compare with a programme of 1·1 million bales for the financial year ended March, 1961, and of 1·3 million bales in the year ended March, 1960.

* * *

Uganda Textile Expansion

Nyanza Textiles £1,000,000 expansion scheme in Uganda which will double the Jinja Factory's Nytil fabric production capacity, is reported from Kampala by Barclays Bank D.C.O. to be well on schedule and is expected to be completed in August, 1961. Already 105 of the 330 new looms installed are weaving and the machinery is expected to be working to maximum capacity towards the end of the year.

* * *

"Tricel" at Outfitters Exhibition

A new comprehensive selection of men's wear in "Tricel" and blends will be exhibited by British Celanese at the N.A.O. Exhibition, Harrogate, September 26 to 28, 1961. The garments on show will include lightweight suits, slacks, showerproof coats, ties, underwear, shirts and pyjamas. Particular emphasis will be placed on new blends for lightweight suits, on slacks and showerproof coats in "Tricel"/rayon/nylon and on ties made from 100% "Tricel", many of which follow the Continental trend in colour and design.

* * *

Glacier Metal in South Africa

Glacier Metal Co. Ltd., Alperton, Wembley, announce that arrangements are well advanced for the formation of a subsidiary in South Africa which will manufacture plain bearings for that market. Production is expected to start in nine to twelve months.

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Textile Trade and Prospects

Unsettling Influences Affect Lancashire's Trade

The chief reaction of many in Lancashire spinning and weaving sections to the Chancellor of the Exchequer's proposals is one of profound disgust at this pathetic display of lifeless milk-and-water economics. Keyed-up over several weeks to expect some new approach towards a solution of the country's muddled economic policy, most people would have been glad to support and follow a determined lead. Instead, they are served up a similar mixture as before, without any serious attempt being made to halt the interlocked and constantly increasing spiral of wages and costs. Increasing the purchase taxes on luxury goods and other items does nothing to encourage or help manufacturers to counter the intensive foreign textile competition in the home market in cloth and made-up garments coupled to a complete absence of positive effort to encourage greater incentive and drive for export markets. A more negative attitude would be hard to imagine but the most irritating aspect is that these palliatives must inevitably result in more industrial unrest, higher costs *and less production*, and these factors are just not peculiar to textiles alone.

Trading in the last few weeks has been distinctly spasmodic. Uncertainties created by the international situation, the country's economic difficulties, problems of the Common Market, the Hongkong export quota and other unsettling influences have made traders think twice before committing themselves too far ahead. Raw material values have been constant and favourable but even these have not helped much to stimulate orders or more than casual interest. In a listless market yarn sales have been of very modest proportions but inquiry has covered a reasonable range of counts and qualities. The off-take in standard, medium weaving qualities has been disappointing and early delivery dates have failed to boost the slow market. Coarse ring yarns have been in good demand but support for combed doubling wefts has again sagged badly. Most condenser yarns—bleached and natural—are easy to sell but there has been a noticeable hesitancy amongst buyers of hosiery qualities. Interest in blended yarns has been reasonable and certain novelties are in keen request. Nylon and "Terylene" mixtures have sold freely.

Indecision has also been prominent among cloth buyers and future prospects remain obscure. Cloth stocks have not been depleted to the levels usually reached at this time of the year and, as a consequence, purchases have been severely scaled down. Although margins have been reduced to the minimum on many cloths buyers have been very reluctant to order more than the bare necessities. Forward buying is little in evidence. A few lines of dress goods have moved satisfactorily, and new designs in some printed and woven, medium qualities have found support. Interest in some dobby and jacquard styles has been very casual and rather more buyers have favoured printed cloths. Medium quality all cotton and spun rayon shirtings have sold in modest quantities and nylon and "Terylene" specialities have sold steadily. The market for furnishing fabrics has been extremely sluggish and sellers able to dispose of any portion of their production have been fortunate. It is a situation in which the present turnover does not balance output with the inadequate labour force at present employed. Any quick resumption of buying would certainly give rise to several bad bottlenecks in the various sections. Household textiles are not being absorbed fast enough to cope with present productive capacity. Although there are little, if any, complaints regarding prices the market lacks interest and manufacturers' stocks of some cloths are beginning to rise. What cloth has been sold seems to have been fairly well distributed among woven and printed styles. A few orders for industrial cloths were booked during recent weeks but here also the conditions are not conducive to buying ahead on a larger scale.

Wool Progress and Prospects

Stocks of wool in the U.K. at May 31 were estimated by the Wool Industry Bureau of Statistics at 233·6 million lb. (clean), 1·6 million lb. lower than a month earlier. Merino stocks were 3·1 million lb. lower and other stocks 1·5 million lb. higher. Compared with a year ago, stocks were down 2·5 million lb. The bureau estimated the U.K. government stockpile at the end of May at about 32·2 million lb., made up of 18·7 million lb. merino and 13·5 million lb. other wool. Wool consumption rate in the U.K. in May was 3% lower than in April, but unchanged compared with a year ago. Consumption for topmaking purposes was 3% higher than a year ago, this being offset in the total by a decline of 4% in consumption on woollen trade account. Worsted yarn production rate was 6% below that of April, but 4% higher than a year ago; while the fabric delivery rate showed a slight improvement on the previous month and also on May of last year. May output figures were: wool consumption, 43·2 million lb. (clean); top production, 28·7 million lb.; tops drawn, 16.7 million lb.; worsted yarns delivered 21·1 million lb.; woven fabrics delivered, 29·3 million sq. yds.; blankets delivered, 2·1 million sq. yds.

The recent London wool sales closed on a firm note, with prices substantially endorsing those paid at the final sale of the Australian marketing season. There was sustained demand for wools of all types, and market sentiment was good. Open market for Commonwealth wool is now at a between-seasons standstill until the 1961 - 62 selling season opens in Sydney and Melbourne on August 28. South Africa's season opens on September 1, and New Zealand sales towards the end of October.

Present floor price level of 33*d.* a lb., ex-store New Zealand, for greasy wool offered at approved auction sales in New Zealand and the U.K. will be maintained during the 1961-62 season beginning this week. The decision was announced by the New Zealand Wool Commission with the agreement of the Minister of Agriculture, T. L. Hayman, and after consultation with the Wool Board. In fixing prices for individual types of wool, the coarsening trend in growers' auction offerings was considered and, within the level of 33*d.*, minor variations have been made between fine and coarse wool prices, resulting mainly in slight increases in the floor level for the coarser types.

Except in unforeseen circumstances, the policy of the Wool Commission will continue to be to buy in at floor prices, based on the overall level of 33*d.* greasy, ex-store New Zealand, all wool not bought by commercial buyers at above the floor prices. Record quantity of wool—425 million lb.—was sold at auction in New Zealand in the season which ended June 30. Greasy wool totalled nearly 421 million lb., or 1·25 million bales, as against 409 million lb. (1·22 million bales) in 1959 - 60. Income from the clip was £71·6 million, compared with £76·9 million in the previous season. Average price for greasy wool was 40·3*d.* a lb.—4·3*d.* lower than a year ago.

Australian wool production for the 1961 - 62 season is forecast by the National Council of Wool Selling Brokers of Australia at 1,679 million lb. (greasy), and receipts into selling brokers' stores at 4·8 million bales. Merino proportion of the clip is estimated at 76%. Preliminary estimate for last season's clip was: production 1,600 million lb. (greasy), receipts, 4·7 million bales. If the 1961 - 62 estimate is realised, Australia will market the second largest clip in her history. Record is the 1959 - 60 figure of 1,689 million lb.

Linen Exports Decline

The contrast in activity between the wet and dry spun sections is, in effect, a measure of their competitive positions in world markets to-day. The common raw material source eliminates any advantage which one section might possess over the other in respect of this element of cost, so that the high level of activity in the dry spun section, and the sustained demand for its products derive from different factors in the build-up of end product quality and cost. Linen still retains high priority for many purposes as an industrial fabric, despite intensive competition by cotton and man-made fibre products, due mainly to its exceptional physical properties, including tensile strength and absorbency. Also raw material and manufacturing costs of the relatively heavy dry spun linens used in this sphere compare favourably with competitors. By contrast the high manufacturing cost of the finer wet spun linen products discounts any initial raw material price advantage and compares unfavourably with those of competitors.

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Bridging this price gap is not easy but a solution must be found if further contraction is to be checked in the wet spun section. It involves not only the introduction of new manufacturing techniques but also training of personnel to operate them. This was stressed by the Duke of Edinburgh when he opened the new Technical College for further education at Lurgan, N. Ireland. He was convinced the future lay in making the best use of the intelligence of the next generation to increase efficiency with modern methods and ideas. The world was full of unskilled labour which could be utilised to set up industries in less well developed countries and the future here lay in producing goods which demanded a high degree of skill and intelligence.

Wet spun flax yarn exports formerly employed a substantial percentage of the N. Ireland spinning capacity, the main markets being in West European countries. Continental spinners are now increasing their hold in these and—more serious—expanding exports to this country. The problem of bridging the price gap, at present in their favour, will be aggravated by the agreed reduction in working hours without loss of pay in the N. Ireland trade, to be effected in two steps—from 45 to 44 beginning July, with a further reduction to 43 in December.

Export figures covering the four months ending April 30 for flax yarns and woven goods register a substantial decline on those for the corresponding period of 1960 over the whole range excepting thread. Yarn shipments declined by approximately 14%, piece goods by 20%, and made up goods by 15%. The most serious drop is in the important U.S. market to which the value of exports fell by 30% in the first four months of this year. This market normally absorbs approximately one-third of the total British exports of household and apparel linens, and an alternative outlet cannot be readily found to absorb a decline of this extent. There is a growing tendency in the British industry to accept such set-backs as the inevitable conseuqence of competition by cotton and man-made fibre textiles, which are considered to be favoured by an unbridgable price gap. While the absence of alternatives is open to question more detailed examination of the facts reveals that a substantial percentage of the loss has been conceded to linen imports from other sources, including centres in Continental Europe.

Field work and holidays have reduced output by the scutch mills to a minimum so that there is little raw material on offer and the selection is poor, low grades predominating. With demand sustained by the British dry spun section and by Continental mills prices remain firm and all material is being disposed of. Harvesting of the 1961 crop has begun. Reports generally comment favourably on straw quality and crop yield, which should be reflected in fibre outturn. Current values are £173 per ton (Courtrai "A"); £179 ("B"); £185 ("C"); all c.i.f., U.K., July shipment.

Removal of the subsidy to N. Ireland growers constituted an effective damper on domestic production, a token acreage only being grown. As the new technique of green straw processing requires local supplies for economic reasons it is important that the long tradition in growing and handling this highly specialised crop should be maintained. Plans are afoot to increase production in 1962.

Lull in Jute Trade

The firmer raw jute market in Pakistan in June was due to several factors. Two weeks of continuous rains in East Pakistan held up supplies to the baling centres as demand from several countries increased for early shipment fibre. As a result, the July position became over sold and most shippers raised rates. This affected the August position as some early contracts had to be delayed because of the shortage of ready fibre. Arrivals from up-country in East Pakistan have been disappointing. The fibre has been wet with quality in many instances not being up to standard. This dearer trend may only be temporary and once a greater weight of crop comes on the market, prices should return to normal level. The recent increase in prices only affected the July, and to a lesser extent, August shipment positions and sellers are still willing to discount for forward shipment. During the past few months prices of raw jute have had a substantial fall. At the beginning of March, Mill Lightnings were £208 for early shipment whereas at the beginning of July there were sellers at £153 and reactions are inevitable when a tight supply position occurs at the beginning of the season.

A few countries have been in the market for raw material supplies but Dundee spinners have shown little interest and buying has been confined to small quantities. The forward shipment position is similar but heavier buying must begin during the next three months but by that time a much greater weight of the crop will be on the market to counteract the greater offtake. Mill Firsts were being offered at £158 10s., Mill Lightnings at £153 10s. and Mill Hearts at £148 10s., c.i.f. U.K., for July shipment, at £146 10s., £141 10s. and £136 10s. July/Aug., at £138 10s., £132 10s. and £127 10s. Aug./Sept. and at £132, £126 and £121 Sept./Oct. The present dearer trend in values has not had the same effect on dark jute prices because Tossa qualities are not available until later. Offers were being made at £135 10s. for grade Tossa-2/3, at £129 10s. for grade Tossa-4 and at £124 10s. for Continental Tossa-2/3 for Sept./Oct. shipment and about £5 per ton less would be accepted for shipment a month further ahead.

Prices of yarns and cloth in the U.K. were reduced substantially during the past month. This was due not only to the decline in raw material prices during the first half of June but to the fact that the basis of calculation was transferred from old to new crop fibre. These lower rates did not stimulate much additional buying as consumers are looking for still lower values when the full weight of new crop comes on the market. At present, the business is mainly in small quantities for early delivery with little or no interest shown in the forward position.

Output in Dundee and district is well below production in the first quarter of the year with few signs of any improvement so far. However, this has meant a much lower consumption of raw material and spinners have been able to remain out of the market when prices were at a high level. Consumers of jute yarns and cloth are holding small stocks as practically all business negotiated has to be for immediate delivery. A big potential demand is building up and once prices show signs they have reached the bottom and likely to remain for some time considerable business should result.

The heavy end of the trade is quiet with demand for sackings and tarpaulins at a low level. A slight improvement has taken place and production should remain at present levels until the annual holidays at the end of the month. The Calcutta goods market has fluctuated within narrow limits but prices of hessians and sackings have been well below the raw jute equivalent. The Calcutta mills ceased working for a week during June and a further stoppage of a week will take place this month to conserve raw material stocks. Buying by the U.K. has been small and this has been mainly for hessians. Quotations are at 73/- for 10 oz., 40 in. and at 57/- for 7¼ oz. per 100 yd. f.o.b. Calcutta for July/Sept. shipment and at 70/3 and 53/- Oct./Dec. B twills were at 230/3 and 208/6 for the respective shipment periods.

Easier Off-take in Silk and Man-Made Fibres

One bright spot in a somewhat gloomy month is the steady demand for secondary and tri-acetate fibres. The position at the moment on the spinning side is not very cheerful and the growing impact of overseas competition is having its effect on order books. The most recent news by the Chancellor of the Exchequer does nothing to help dispel the gloom and some are of the opinion that the repercussions will adversely affect the already insecure state of trade. Demand for staple yarn is not as good as it was but the interest continues in novelties and new yarn blends and constructions. There are reports of increased business in cotton/"Terylene" blends for men's shirtings and silk and the acetates are the bright spots in the dress goods trade. Deliveries of "Terylene" to worsted spinners and manufacturers have been well maintained and a fair proportion of acrylic fibres are being used in blends for men's suitings. Acrylic yarns are in good request with jersey fabric knitters. This section of the trade is extremely active at the moment with order books in a very satisfactory state.

Lining manufacturers report active conditions for viscose rayon and acetate cloths and silk is also in good demand by the Yorkshire trade. Macclesfield/Leek areas are not altogether happy at the present state of affairs with autumn orders slow in materialising. Throwsters are fairly active, especially with silk and bulked yarns remain in excellent request. Screen and roller printers are reasonably well employed at the moment but a little apprehensive about the future. Hand block printers are finding things very slow indeed, but commission dyers, despite competitive margins, continue to find plenty of work.

Trade is quiet with many smallware manufacturers although some narrow fabrics have been in brisk demand, particularly nylon ribbons. Petershims, gimps, etc., are in fair demand also nylon laces. Trimmings are in request especially for knitted goods, and fancy piping is in good demand. Woven collars are being increasingly used for knitted cardigans and sweaters. Thread manufacturers report keen support for all-silk thread, with sustained interest in blends of cotton/"Terylene" blends.

Unique *plug-in* limit switch saves maintenance time on the plant

Replacement in 20 seconds — that is the time it takes to unscrew and replace the new Honeywell 200LS Plug-in Limit Switch. Permanently wired terminal housing need not be disturbed once fitted . . . the switch with its actuator housing is simply plugged in and removed as required.

electrical rating: 10 amps for 120, 240, 480 volts AC; pilot duty rating 600 volts AC max.
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Where space is at a premium — the new LS Compact Series of limit switches offers the same high electrical rating, contact arrangement, actuator variation and robust housing. These very small switches (3·69″ x 2·5″ x 1·56″) have fully adjustable actuator heads to meet all industrial needs.

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Notes and News

Cotton Board Productivity Centre

Some interesting figures emerge in a recent bulletin from the Cotton Board Productivity Centre. Support given to the Centre, the bulletin states, has continued to grow so that by the middle of 1961 about 500 firms have participated in various training activities. During the re-organisation of the industry, when many mills closed, only about 40 firms had to be deleted from the Centre's list of supporters. Most of the Centre's work is done, naturally, in Lancashire but firms in Scotland, Devon, Dorset also make use of the Centre's services.

Since the first training course, organised by the Cotton Board in Blackburn in 1949, the range of the Centre's activities has been considerably extended. Over 3,000 junior and senior executives have attended the various training courses in work study, cost control, quality control etc., and it has been encouraging to see how many have returned to attend the many meetings which are arranged to discuss new topics or current problems. Copies of the bulletin giving further details of the Centre's activities are available on request from the Cotton Board, Royal Exchange, 6th Floor, Manchester 2.

* * *

New Plant to Manufacture Isocyanates

A multi-million pound sterling plant for the manufacture of isocyanates, a basic raw material used in the production of urethane foams, is to be built by Du Pont Co. (U.K.) Ltd. on its plant site at Maydown, near Londonderry, N. Ireland. Announcing this, W. H. McCoy, managing director, of this subsidiary said the new facility will supply "Hylene" organic isocyanates, used in making both rigid and flexible urethane foams for markets in the U.K. and for export to other countries in the Free Trade Area. Flexible urethane foams are used chiefly for furniture and car cushioning and interlining for clothing. Rigid foams are used primarily for insulation in refrigeration units, building panels, and other industrial purposes. Construction will get under way later this year.

* * *

Technical Information

The following publications are now available from I.C.C. Ltd., Dyestuffs Division, Blackley, Manchester:—

No. 617. Procinyl Dyestuffs on Nylon (recipes in tabular form).

No. 618. Procion Dyestuffs: Application to Wool/Viscose Union Piece Goods by the Warm (Bicarbonate) Method.

PC/U.26. Pipe Insulation by Polyurethane Rigid Foam.

New Observations on the Tippy Dyeing of Wool—H. R. Hadfield and D. R. Lemin (provides new information on the relation between dye constitution and behaviour in dyeing skittery wools).

* * *

Producing Acrylic Fibre in Poland

Courtaulds Ltd. and Procindus Ltd., a wholly-owned subsidiary of Courtaulds, have signed a contract with Polimex, Polish Export and Import Company for Machines Ltd., of Warsaw, under which Procindus will make available "know-how" and supply plant and machinery for a factory at Lodz, Poland, to produce acrylic fibre. The value of the contract is approximately £2 million. Deliveries of plant and machinery will be made in 1963. Previous overseas contracts have included: (1958) U.S.S.R., acetate yarn plant. Value approximately £4 million. (1959) U.S.S.R., plants for viscose tyre cord, acrylic fibre and acetate yarn. Value approximately £15 million. (1960) Yugoslavia, acrylic fibre plant. Value £2 million.

* * *

New Elapsed Time Meter

A new elapsed time meter for recording the time a piece of equipment has been in use is announced by English Electric Co. Ltd. It can be applied to any equipment used intermittently and on which planned maintenance or a time log is required, e.g. pumps, ventilating and heating systems, etc. The meter is normally connected so that it is automatically switched on and off with the apparatus being metered. It can register up to 9,999·9 hours in steps of 0.1 hour.

The cyclometer register is driven by a self-starting, non-reversing, synchronous motor, through a train of gears. Operation is on a.c. supply in the voltage ranges 100–125, 200–250 and 400–440. The frequency can be 50 or 60 cycles. ' The meter is available in two case types.

The first (Type H21M) is a 4 in. square, flush mounting, switchboard pattern case. The second is a 2½ or 3½ in. (Type S25 or S35), square moulded black plastic case designed primarily for panel mounting.

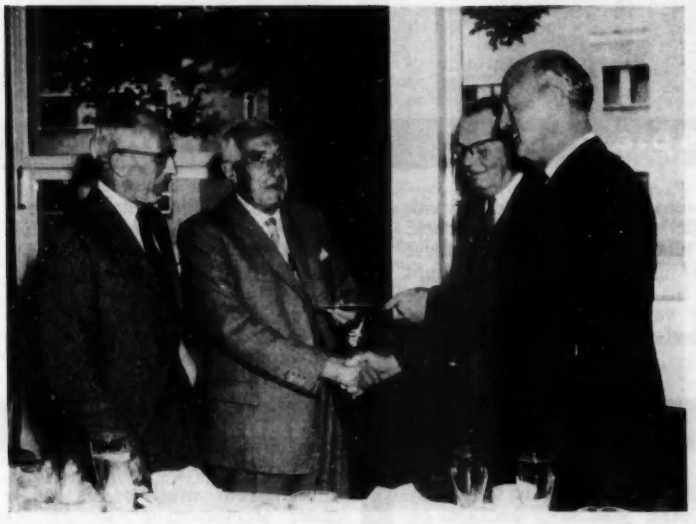
New Appointments

Mr. K. T. B. Rimington, a director of Platt Bros. (Sales) Ltd. and Platt Brothers and Co. Ltd., Oldham, has been appointed director for woollen, worsted, carpet weaving and waste machinery sales in the U.K. and overseas. Mr. L. Firth has been appointed technical advisor (wool and worsted) Platt Brothers and Co. Ltd. and Platt Bros. (Sales) Ltd., and operates from his home address, "Roseland," 25 Cornmill Lane, Liversedge, Yorks.

* * *

Shirley Tribute to Former Chairman

At a recent luncheon of the Council, Mr. N. G. McCulloch, C.B.E., was guest of honour when he was appointed to the Association's Board of Honorary Life Governors—the highest honour the Association can accord—in recognition of his outstanding services to the Association and the industry. Mr. McCulloch, for many years one of the leading personalities in the finishing section of the trade, has been intimately associated with the Shirley Institute for over 20 years. He served on many of its committees, and was chairman from 1949 to 1960, one of the most important periods in the history of the Institute. He played a leading part in the discussions which led to the recent fusion of the British Cotton Industry Research Association and The British Rayon Research Association, and it was particularly fitting, therefore, that his appointment to the Board of Honorary Life Governors was made by the Council of the new organisation in which the cotton and man-made fibre interests are now integrated and unified.



Sir Cuthbert Clegg handing to Mr. McCulloch a letter formally conveying Council's unanimous decision that he be appointed to the Board

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Henrietta House, 9 Henrietta Place, London, W.1. Tel. MUSeum 8311

"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

Starch Products in Production at Falkirk

In January of this year Starch Products Ltd. acquired a controlling interest in W. Caldwell and Co. Ltd., at which time the name was changed to Starch Products (Scotland) Ltd., new premises were established and the structure and scope of the company enlarged. The new factory is situated in the spacious Port Downie works at Camelon, near Falkirk, Stirlingshire, where for the past few months new equipment has been installed to make it one of the most up-to-date and well equipped plants of its kind in the country.

The Scottish company can offer a full range of speciality products such as the well-known "Viscosol" surface starches for paper making and coating, including lacquer starches and starch/Mannogalactan formulations. In addition stocks of wheat starch and powdered (Vital) gluten manufactured in the Stadex Works at Slough are held at Camelon and the company's own transport ensures prompt and regular deliveries at short notice. Starch Products (Scotland) Ltd. is well placed to ship direct from Scottish ports to selected export markets, including North America, and special attention is being directed towards expansion in these fields.

* * *

New Procion Orange

Procion Brilliant Orange H2R, the latest addition to I.C.I. Dyestuffs Division's reactive dyestuffs range, gives bright reddish orange shades of moderate light fastness and very good fastness to wet treatments. The newcomer is expected to find wide use in both dyeing and printing, both in self-shades and in combination with Procion Scarlet HR. Suitable for application to cellulosic materials by all the established methods for Procions of the "H" class, its high tinctorial strength and excellent build showing to good advantage. The same advantages are manifest in textile printing, and the new dye can be applied to cotton and viscose rayon by either the steaming or dry heat fixation technique.

* * *

New Wool Knitting Yarn

New addition to wool knitting yarns is "Dragonfly 707," a pure wool chunky crepe which will help to meet the continuing vogue for "chunkies." It is produced in ten shades and white and sells in 2-oz. hanks for 2*s.* 10*d.* The new yarn is a product of W. G. Spinners. With the hand knitting wool boom continuing, production by British spinners is running at record levels. In the first five months of the year deliveries of hand knitting yarn by mills totalled 17.9 million lb.—3 million lb. up on the same period in 1960. Exports were about 9% of the total, the rest being for home consumption. Wool comprises nearly 90% of knitting yarn production.

* * *

Wool Textiles and Common Market

Broadcasting in a B.B.C. radio programme on the European Common Market controversy, T. C. Fraser (director, Wool Textile Delegation) said that while some British firms might expect to gain if the U.K. joined the Common Market, others would undoubtedly lose. It was difficult to strike a balance on the net result, as about 1,200 firms were affected but, in the long run, he thought such a balance would be favourable. About 29% of U.K. export, by volume, went to Commonwealth countries and 18% to Common Market countries, Mr. Fraser added. The proportions were different on the basis of value, as cloth exported to the Six was of higher average value than that exported to the Commonwealth. Manufacturers likely to fare best in the Common Market would be those making higher priced goods.

* * *

French Wool Trade

Hopes that the modernisation plans carried out recently in the French wool textile industry will increase production in 1961 by 15% over the 1959 figure were expressed at the annual meeting of the French Wool Industry Federation. Delegates were told that the 1960 wool textile production showed a rise of 8·6% over the 1959 figure.

* * *

Improved Golden Yellow Vat Dye

The Dyestuffs Division of I.C.I. announce the addition of QF Caledon Printing Yellow GW Paste to their range of QF vat printing pastes. The new dye, in common with its predecessors in the QF series, shows the characteristic improved tinctorial yield under difficult steaming conditions, while the non-settling, non-drying character of the paste and its high resistance to low-temperature storage are advantages already well appreciated. QF Caledon Printing Yellow GW Paste is similar in shade and printing behaviour to the well-known Caledon Printing Yellow GK but, unlike the latter has the great virtue of not staining the unprinted portions of the fabric during the initial soaping aftertreatment. It is, therefore, of particular interest as an illuminating colour in discharge printing styles. QF Caledon Printing Yellow GW Paste is eminently suitable for dress fabric prints but is not recommended for furnishing fabrics.

* * *

Chemstrand Expansion

Chemstrand Corporation, the American parent company of Chemstrand Ltd., announce plans to expand nylon yarn capacity at the Chemstrand nylon plant at Greenwood, South Carolina, by 200%. The expansion was necessary, said Mr. E. A. O'Neal, Jr., president, Chemstrand Corporation, because of continuing market demand for nylon textile yarns. He mentioned that this was the fifth major expansion in nylon capacity announced by Chemstrand since the corporation began producing nylon in 1953. Much of this increasing demand for nylon, he said, was due to advancing nylon technology. Such innovations as texturing, modified cross-section yarns and other developments, had given nylon a versatility that adapts it to a wide variety of end-use products.

* * *

New Tweed for Skye

An expansion of the handwoven tweed industry on the island of Skye is being undertaken by D. Ballantyne Brothers and Co. Ltd., Peebles. Twelve pedal-operated handlooms are already producing cloth in the crofting centres of Portnalong, Fiscavaig and Fernilea to meet orders received from the U.S., Canada, Sweden and elsewhere, as well as the home market.

Announcing this, Mr. H. Ballantyne (chairman), said that the venture represented a bold departure from tradition in that the cloth being woven was quite different from the Harris tweed type usually associated with the Hebrides. "One might describe it as a cross between Harris and Shetland, but extremely light in weight," he said. "While we have started in a very modest way, there is a nucleus of some fifty families in the area with a tradition of weaving and given reasonable success I think we could eventually employ up to 100 people." Mr. Ballantyne added that an important feature of the cloths was that they are being woven from all-Scottish wools; none was imported. The yarn is spun at the company's mill in Peebles and is then taken by road to Skye. The training of weavers is being carried out by one of the firm's specialists in weaving. The woven cloth is sent to Peebles for finishing and despatch.

* * *

Prices of "Terylene" Staple Reduced

I.C.I. Ltd. have reduced the prices of all "Terylene" staple, tow and top, by 10*d.* per lb. In addition, 1½ den. staple fibre will be reduced by a further 6*d.*, making the new price the same as for other "Terylene" staple fibre products.

These price cuts follow the recent reduction of 6*d.* per lb. for combed top used by the Yorkshire trade and the wool/worsted industry generally. Expanding production has made the reductions possible. "Terylene" filament yarn prices remain unchanged.

* * *

Change of Address

The address of the Manchester office of The English Electric Co. Ltd. is now English Electric House, Crossford Court, Dane Road, Sale, Ches.

* * *

A.S.T.M. Publications

The American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa., announces the availability of a 62-page list of publications. This list describes the symposiums, manuals, special publications, indexes, compilation of standards, charts, reference photographs and reports published by the Society through the years. More than 300 items are fully described, 40 of which are new and not previously listed.

* * *

Brook Canadian Subsidiary

Brook Electric Motors of Canada Ltd., have now moved into larger premises on the new trading estate area at Rexdale, near Toronto Airport. Increasing business since the subsidiary was launched two and a half years ago has made this move necessary.

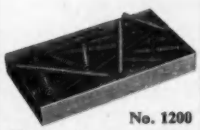
* * *

Scottish Wool Design Awards

First and second prizes in the Textile Institute's Beanland Competition for the design of woollen and worsted fabrics have been won by Scottish Woollen Technical College students at Galashiels. Winners were Angus MacDonald, North Tolsta, Isle of Lewis (first prize of £50 and certificate) and J. Trevor Ogilvie, Orchard-head Road, Edinburgh 9 (£20 and certificate). Design work of both students was executed at the college where they are taking a three years' course in woollen cloth manufacture.

EXPERIMENTAL SPRINGS?

That spring you want . . . in a hurry . . . where is it? Pick what you want when you want it from TERRY'S BOXES OF ASSORTED SPRINGS—our fine range of small boxed assortments of experimental springs. We can show you only a few from the range here. Send a postcard for our full list—and if ever you're stuck with a spring problem send it along to our Research Department—they'll gladly help you out.



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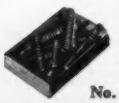
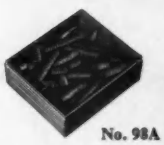
Three dozen Assorted Light Expansion Springs, suitable for carburettor control etc. 15/-



No. 760
Three dozen Assorted Light Compression Springs. 1" to 4" long, 22 to 18 S.W.G., ¼" to ½" diam. 7/6



No. 98A
Three dozen Assorted 1" to 4" long, ¼" to ⅝" diam., 19G to 15G. 6/6

No. 753
Three dozen Assorted Light Expansion ¼" to ½" diam., 2" to 6" long, 22 to 18 S.W.G. 12/-

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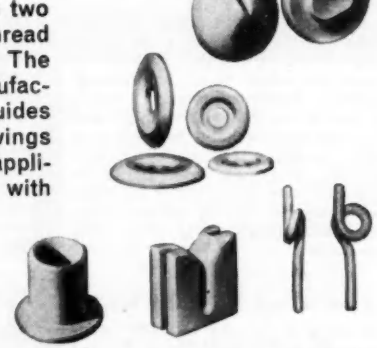

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RECENT TEXTILE PATENTS

These abridgements are republished from specifications by permission of the Comptroller of H.M. Stationery Office. The full specifications can be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2. Price 3s. 6d. each (accompanied by remittance).

837,643 Top Arm Drafting Apparatus

CASABLANCAS HIGH DRAFT CO., LTD., *Bolton Street, Salford* 3, *Manchester.*

A top arm drafting apparatus in which the arm is pivotable on its rear mounting and a spring influenced device is arranged to bear, in the working position between an abutment fixed at the rear of the apparatus, and the arm, so that the part of the arm which overlies the drafting field is positively prevented from lifting upward about the arm mounting beyond a predetermined limiting position. To permit variation of the limiting position, one bearing surface of the device is provided with an adjustable screw which is arranged to lock itself in the selected position of adjustment.

840,508 Feeding Fibres to a Processing Machine

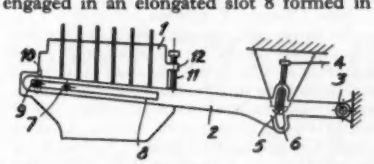
DOUGLAS FRASER AND SONS LTD., *Westburn Foundry, Arbroath, Angus*

Apparatus for feeding fibrous materials to a processing machine such as a card. The material may be jute cuttings, jute waste in tow form, flax, hemp or other bast fibres, or long staple synthetic fibres. The apparatus incorporates means for feeding the material to be processed at least initially as a uniform band of a width narrower than that of the feed to the processing machine, to power-operable means including a finned element adapted to forward the material, and including means to accelerate the rate of travel of the fibres and to distribute the fibres evenly in zig-zag fashion over the width of the feed to the machine.

840,739 Loom Warp Stop-Motion

METAPIC S.A., *Holding Luxembourgeoise,* 144 *Rue de Hollerich, Luxemburg.*

Relates to warp stop motions of the type having droppers engaging reciprocating toothed racks. The warp stop motion 1 is mounted on the ends of two arms 2, each arm being mounted on a pivot 3. The arms may be secured in any desired angular position, with a set screw 4 resting on a stud mounted on a fixed part of the loom, the stud being engaged in an arcuate elongated slot 6 formed in a widened portion of arms 2. The warp stop motion is so mounted as to permit adjustment of its angular relationship with respect to arms 2. For this purpose it may be mounted, so as to swing on pivots 7 engaged in an elongated slot 8 formed in

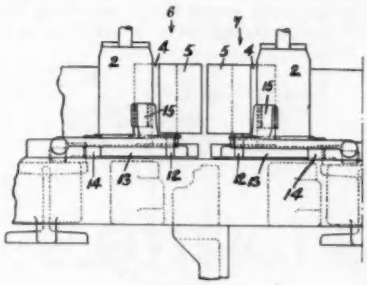


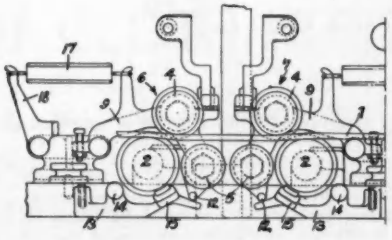
the arms, its angular position being determined, on the one hand, by a pin 9 passing through slot 8 and at the same time through a curved oblong opening 10 in the stop motion and, on the other hand, by a set screw 11 passing through a threaded hole of an ear 12 integral with the stop motion, the set screw having its end resting on arm 2. By screwing 11 in or out, the stop motion may be made to swing upwards or downwards respectively on pivots 7. At the same time the stop motion may be made to slide a short distance on arms 2, in a manner related with the swinging motion. By these joint actions the position of the warp stop motion may be adjusted with great accuracy in accordance with the position of the sheet of warp threads.

841,033 Driving Arrangements for Spinning and Twisting Machines

J. AND T. BOYD LTD., and M. WARNOCK, *Shettleston Iron Works, Shettleston, Glasgow, E.2.*

A driving arrangement for a spinning and twisting machine. 1 denotes a driven snakelike belt running horizontally with its driving face vertical to drive spindles 2, 4 denotes a whorl movable against the belt to cause the drive to be transmitted to the spindle. 5 denotes a second whorl and so mounted adjacent to the face of the belt as to be movable to disengage the belt from the spindle and to maintain the belt out of engagement with the spindle. The sets of whorls 4, 5 are arranged in groups consisting of two sets denoted at 6, 7 disposed adjacent to one another, each group being spaced from an adjacent group by two adjacent spindles. Each set of whorls on a lever 9 mounted at one end in the machine frame for swinging movement about a vertical axis. One arm of a bell-crank lever is so engageable with each lever



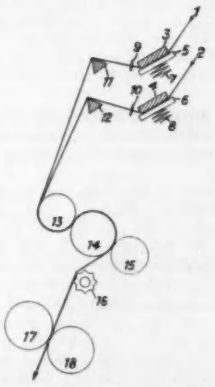


9 as to urge whorl 4 in the direction to cause the belt to engage the spindle. Each lever 9 is formed with a projection 12 engageable with a spring-loaded lever 13 pivoted at 14 in the machine frame. The lever 13 carries a brake pad 15 engageable with the spindle and is spring-urged to engage the projection 12 of lever 9. Adjacent levers 9 are interconnected by a tension spring, apart from the lever at each end of the frame which is connected by a tension spring 17 to a fixed part 18 of the frame. With this arrangement the power required to drive each spindle is just sufficient to drive the spindle without being effected by stoppage of an adjacent spindle.

841,098 Manufacture of Blended Slivers

SOCIETE DE CONSTRUCTIONS MECANIQUES DE STAINS, 81-95 *Av. Aristide-Briand, Stains* (*Seine*), *France.*

Apparatus for the manufacture of slivers of blended fibres and is an improvement of B.P. No. 774,360. The tow 1 passes through a tensioning device consisting of a fixed smooth plate 3 having rounded edges and a shoe 5 urged against the latter by a spring 7. The tow is maintained in position in the tensioning device by a fork 9, and it then passes at a sharp angle over the dihedral member 11. Similarly, the tow 2



passes between the fixed plate 4 having rounded edges and the shoe 6 urged against the latter by the spring 8, the tow being maintained in position by the fork 10, and then passing at a sharp angle over the dihedral member 12. The two tows converge towards the first roller of a set of three feed rollers 13, 14, 15 of a device by which they are drawn until they break, as described in B.P. No. 734937, one tow being superimposed on the other on the first roller. The double-layer tow is drawn until it breaks by the pair of delivery rollers 17, 18 as it passes over a rotating member 16 having non-cutting edges.

841,255 Testing Extensibility of Filaments

DUNLOP RUBBER CO. LTD., 1 *Albany Street, London, N.W.*1.

Apparatus for determining the change in length under load of filamentary material travelling from one point to another comprises three pulleys for supporting the material in the form of two loops, a first loop between the first and second pulleys and a second loop between the second and third pulleys. Means are provided for driving the second and third pulleys, and for applying a load to the first loop and a greater or lesser load to the second loop, with means for each of the loops (each responsible to a change in the length of the loops) for varying the speed of the pulley driving means so as to maintain the loop lengths constant. Means are provided for determining the difference between the length of material passing through one loop and the length of material passing through the other loop in unit time.

841,363 Card Flat Stripping Apparatus

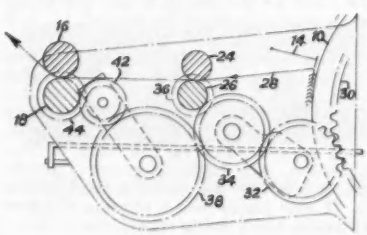
JOH. JACOB RIETER AND CIE., *Winterthur, Switzerland.*

In a flat stripping apparatus for cards, the tips of brush wires which are mounted on a cylinder move in the immediate neighbourhood of the flat along cycloidal paths with respect to the flat, the lowest points of which paths are located between the bottom of the flat and the plane in which the bends are located. The ascending portions of the cycloid conform with the inclination of the bent portion of the wires mounted on the flat. The cycloidal path of the brush wires may be produced by supporting the cylindrical brush on a swingably suspended frame, a spur gear wheel being coaxially connected with the brush. The wheel is driven by a pair of pins rotating around a stationary axis and interposed between the flat and the brush, whereby the brush is simultaneously rotated and moved up and down. Due to the particular suspension and drive of the stripping brush, the fibres and waste adhering to the bottom of the flats are lifted and are stripped past the bends of the flat wires to the outside and removed.

841,391 Improved Method of Carding

CARDING SPECIALISTS (CANADA) LTD., 318 *Lytton Boulevard, Toronto, Ontario, Canada.*

A method of treating cotton fibres so as to facilitate drafting and spinning. 10 represents the doffer of a carding machine, 14 is the comb for stripping material from the doffer, and 16 and 18 are the calender rollers. A pair of smoothly ground ironing rollers 24 and 26 are mounted on the machine immediately beyond the comb, so that the thin card web of the fibres 28—passes from the comb through the ironing rollers to the drawing off rollers. The ironing rollers may be pressed together in any convenient manner, for example by a weighted lever,



spring pressure, or hydraulic means. A wheel 30 is mounted on the doffer shaft (not shown), and meshes with wheels 32 and 34, one of which is a disengaging wheel. The wheel 34 meshes with a change gear 36 mounted on the shaft of the bottom ironing roller and also with a large wheel 38. The top ironing roller is driven from the bottom ironing roller through coupler gears (not shown) on the opposite side of the machine. The wheel 38 meshes with an intermediate wheel 42 which in turn meshes with a change wheel 44 fixed on the shaft of the bottom calender roller 18. The top roller 16 is driven by coupler gears (not shown) on the opposite side of the machine. As there may be a tendency for some impurities and fibres to stick to the ironing rollers, means may be provided for keeping them clear.

841,432 Comber Detaching Roller Weighting

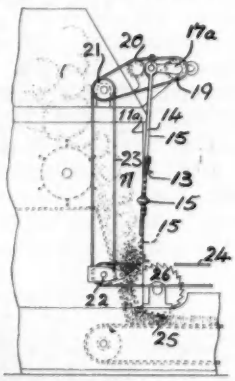
T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

In a rectilinear comb the top back detaching roller is loaded through the medium of a lever, having an off-set arranged to bear upon the roller neck. and which is pivoted in front of the rollers. The lever has two depending legs, of which the first is connected through a spring with an operating lever which can be moved and locked so that it tensions the spring to apply loading pressure to the roller. The second leg co-operates with an abutment associated with the operating lever, and which, when the latter is released, engages the second leg and swings the loading lever about its pivot into an inoperative position clear of the roller neck. The arrangement permits the top back detaching roller to rock about the co-operating bottom roller.

841,559 Feeding Apparatus for Cotton etc.

BRITISH COTTON INDUSTRY RESEARCH ASSOCIATION, *Shirley Institute, Didsbury, Manchester.*

The hopper feeder shown is basically of conventional design, but which has been modified, the usual front wall of the hopper-like compartment 11 from which the cotton is fed to a conveyor having been removed. A new wall 11*a* of similar general form is fitted, but with

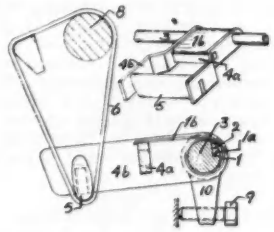


a transverse slit about half-way up extending across its width. The slit in the new wall accommodates a plate 12 of sheet metal which extends across the full width of compartment 11, and is reciprocated to compress the cotton. The end of plate 12 is attached to a transverse rod or bar 13 supported at each end by connecting rods 14 slidably supported in pivoted bush guides 15 mounted at the ends of a transverse member 16 secured to the compartment wall 11*a*. Connecting rods 14 are operated by cranks 17*a*. The rod, at one end, also has mounted thereon a chain-wheel and a drive is effected through a chain. The drive transmission (through chain-wheels) is associated with the drive to a travelling endless conveyor 25 which carries away the mass of cotton fed from the bottom of the compartment, in such a manner that either the ratio therebetween can be maintained over a given range of speeds, or, alternatively, the relative speeds can be varied so as to vary the density and thickness of the material carried away. The disposition and dimensions of the plate, its supporting members and the slit through which it passes are such that, as the cranks 19 are rotated, and the feeder in operation, cotton which reaches the hopper-like compartment in the usual way is subjected to the action of plate 12.

841,583 Apron Tensioning Device

SPINTEX SPINNEREI-MASCHINENBAU G.m.b.H., 92 *Fornsbacherstrasse, Murrhardt, Germany.*

A spring-loaded tensioning stirrup for lower aprons of drawing arrangements in spinning machines. The device comprises a leaf spring 1, having ends 1*a* and 1*b*, and a stirrup 4*b* having a cross-member 4*a* and extending guide 5. The median portion of the spring is curled and embraces a carrier bar 3 provided with a groove 2, whereas the end of 1*b* of the spring bears with tension against the

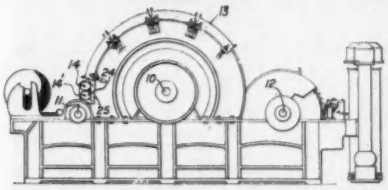


member 4*a* and the offset end of 1*a* is in engagement with the grove. Drawing rollers (not shown) press the drawing roller 8 against the apron 6 and the spring is tensioned so that the apron is tensioned by the stirrup 4*b*. The carrier bar 3 is pivotable about its axis and has levers 10 mounted on it and each lever has a screw 9 with one end abutting against a part of the frame of the spinning machine. Thus the tension of the apron is made adjustable by the screws 9.

841,609 Improved Granular Card

R. A. RUSCA, 6530 *General Haig Street, New Orleans, Louisiana, U.S.A.*

An improved carding machine has the usual carding cylinder 10, lickerin 11, and doffer 12. The revolving flats and their accompanying mechanism have been eliminated and replaced by a stationary cover comprising a number of similar carding plates 13 as described in B.P. No. 836668. In addition, at a position just above the lickerein, a pair of saw tooth rolls 14 and 14′, which extend completely across the cylinder, have been added. The rolls are mounted in bearings 24 at each end supported in brackets 25. Any conventional



means can be used for mounting the rolls in such a way that they are adjustable to each other and to the cylinder, and they can be of the same diameter or of different diameters, practical limits being from 2 in. to 7 in. diameter. The rolls are covered with saw type teeth which have a rake in one direction.

841,645 Speed Control for Winding etc., Frames

BARMER MASCHINEFABRIK AKT. GES., *Wuppertal-Oberbarmen, Germany.*

A device for controlling the speed of winding bobbins or the delivery mechanisms on winding, twisting or spinning frames, which wind the thread with a variable package diameter. A belt travelling over two fixed rollers is provided in a drive between a motor and a single winding bobbin or the supply mechanism and the belt is arranged to be displaceable on both rollers by means of a thread feeder responsive to the tension of the thread in a loop. A rotational member arranged with its axis of rotation at an angle to the roller axis and contacting the outer surface of the belt in the region of one of the rollers, imparts a movable speed of rotation to the latter or derives such a variable speed from it.

842,174 Lint Remover on Knitting Machines, etc.

MELLOR BROMLEY AND CO. LTD., *Minotaur Works, St. Saviour's Road East, Leicester.*

A device particularly for a knitting machine comprising an improved, inexpensive and efficient self-contained apparatus for drawing off fluff or lint from the machine. A self-contained low-efficiency unit is used for creating a flow of air at a low pressure, and is operated when the machine is running. A stationary tubular suction component is provided through which the compressed air at the low pressure is blown, this component being formed to provide a venturi effect whereby the speed of flow of air blown straight through the component is locally increased for the low pressure of the air. A lint receptable is provided with which the tubular component comunicates and into which the air passes, and tubes of small diameter are connected with the tubular suction components and extend to locations of the machine from which fluff is to be drawn away. Lint sucked into the tubes of small diameter is passed into the suction component through which it is drawn, and passed into the receptacle.

842,472 Cone Drum Motion

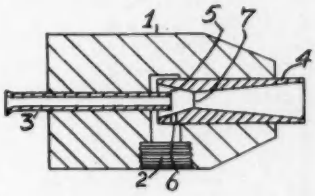
HOWA MACHINERY LTD., No. 1900 *Sugakuchi, Shinkawa-Machi, Nishikasugai-Gun, Aichi-Ken, Japan.*

An apparatus for the return movement of a cone belt in a flyer frame. A main drive transmission provided for driving the first cone, includes a release mechanism for disconnecting the main drive transmission from the cone. There is provided auxiliary drive mechanism for driving the second cone while the frame is stopped, and a return mechanism for effecting return movement of the rack and anchor bar to their starting positions while the auxiliary drive mechanism is driving the second cone.

842,762 Bulked Yarns

COURTAULDS LTD., *London.*

Exceptionally bulky yarns are obtained by feeding a bundle of filaments having latent crimp into a zone of turbulent steam produced by a high velocity flow of steam, and withdrawing the bundle at a rate less than the feed rate. In one example, viscose having a cellulose content of 7·5% a caustic soda content of 7·0% and a salt figure of 5·8 to 6·2 was spun by means of a pump having a throw of 117 grams/minute through a 150 hole jet, into a coagulating bath at 60°C. containing 8·5% sulphuric acid, 2·0% zinc sulphate and 24% sodium sulphate. After an immersion of 30 inches the filaments were withdrawn, stretched 65% in a bath at 95°C. containing 3% sulphuric acid and 6% sodium sulphate. The filaments were then collected in cake-form in a centrifugal box, the twist imparted being about 3 turns per inch, washed in the cake and dried slowly. The dried filaments crimp when treated with water. The product (2000 denier, 150 filament) was then passed through a jet of the kind shown. The jet comprises a hollow body 1 having an inlet 2 for steam a yarn entrance tube 3 and a coaxial yarn exit tube 4. The entrance tube projects slightly inside the exit tube to leave an annular space 5. The tube has a hole 6 in its wall in the vicinity of the inner end of the inlet tube. The diameter of its bore is at a minimum at a point 7 slightly ahead of the inner end of the entrance tube; from this point the bore of the tube is conical in both directions, the angles of the outwardly and inwardly extending conical bores being about 10°. The entrance tube has an internal diameter of 0·035 inch and an external diameter of 0·048 inch. The exit tube has a diameter of 0·073 inch at its narrowest portion. Saturated steam was supplied to the jet at 100 lb. per square inch. The filament bundle was fed to the entrance tube at 36 yards per minute, withdrawn from the exit tube at 22 yards per minute and wound into a package. The product was a bulky yarn of denier 3115.



842,919 Measuring Frictional Properties of Yarns

HOSIERY AND ALLIED TRADES RESEARCH ASSOCIATION, *Nottingham.*

Apparatus for measuring the frictional properties of yarns comprising a friction pillar, means to draw the yarn around the pillar at constant speed, and for applying desired predetermined tension to the yarn running to the pillar, and means are also provided for determining the tension of the yarn running from the pillar. By this means a frictional value for the yarn can be determined. Convenient means for determining the "input" tension comprises balance means and a yarn tension controller by which a balance can be obtained between the "input" tension and a weight, the balance point being given by a pointer of the balance. Means for determining the "output" tension comprises balance means in which variable weight is employed to balance between the "output" tension and the weight, the balance point again being given by a pointer of the balance. The variable weight may be applied by a known "chainamatic loading device". Damping may be applied to each balance means to facilitate the determination of tensions of average value.

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(Spinning and Twisting Machines)

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for the design/development of new spinning and twisting machines. He will have a staff assigned to him and responsibilities ranging from prototype design through to the series production stages.

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responsible for approving designs for the most economic means of production and for general liaison between Design, Standards and Production Departments.

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